6th International Conference

Conference PROCEEDINGS

THEME

ENHANCING QUALITY EDUCATION THROUGH INNOVATIVE PEDAGOGY

FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA
SCHOOL OF SCIENCE AND TECHNOLOGY EDUCATION (SSTE)

FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA

6th INTERNATIONAL CONFERENCE OF SCHOOL OF SCIENCE AND TECHNOLOGY EDUCATION (SSTE)

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DATE 1ST – 5TH OCTOBER, 2018

FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA

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ACKNOWLEDGEMENTS

The Local Organizing Committee of the 6th International Conference of School of Science and Technology Education (SSTE), Federal University of Technology, Minna, appreciates the Management of the University for the Unalloyed Support given to the team which led to the success of this Conference. We also wish to express our profound gratitude for the assistance rendered by the University Management especially in disseminating information relating to this Conference using the University website, Campus News, and FUT Search FM.

We thank the Dean, School of Science and Technology Education (SSTE) for hosting this Conference despite the economy situation in the country. His encouragement, advice, and moral asupport gave the Local Organizing Committee the strength to complete this task and make sure the Conference is successful.

We sincerely thank the academic staff of the School and University Community for their essential roles played towards the success of the Conference. We thank the non-teaching staff for the role played which contributed to the success of this Conference.

The efforts of the Editorial Board is commendable for making sure that the Book of Proceedings was ready before the arrival of the participants. We appreciate the efforts of the Keynote presenter, Lead Paper presenter, and Workshop facilitator for attending this Conference despite their tight schedule.

Finally, we also commend the undergraduate and postgradiuate students of the School for sparing their time for participating in all the events. We thank God Almighty for the strength given to the LOC members to discharge their enormous tasks.

PREFACE

Poor quality education have serious implications on national development, security, economy and manpower of any nation. In recent years, there has been a number of significant changes in the field of education. Integration of innovative pedagogy should be seen as a means of enhancing quality education globally. Presently, students across the world are becoming digitally inclined and therefore, there is the need to become conversant with these emerging trends as it affects the teaching and learning process.

Hence, there is the need for a conference of this nature, where experts can brainstorm so that international communities can benefit from one another and also respond to contemporary innovative pedagogy in education. Innovative pedagy of this nature can enhance quality teaching and learning process. It is worthy to note that application of innovative teaching and learning techniques have a greater influence on the quality of manpower injected into the labour market which may determine the economy growth of a nation.

The theme and sub-theme of this conference "Enhancing Quality Education through Innovative Pedagogy" is based on the prevailing situation of poor quality education in developing nations. I am sure this conference has provided avenue for researchers and educators to share ideas on using innovative teaching and learning techniques that can enhance quality education in under developed and developing nations across the world. I hope the theme and sub-themes meet the needs of the stakeholders in education.
The sub-themes are:

- Social Media for Effective Teaching and Learning
- Team Teaching & Collaborative Learning Strategies for Quality Education
- Assistive Technologies for Special Education
- Project-Based Learning Strategies for Quality Education
- E-learning Platforms for Effective Teaching and Learning
- Mobile Assisted Learning for Quality Education
- Service Learning Strategy for Quality Education
- Innovative Assessment Techniques for Quality Education
- Instructional Strategies for Inclusive Education
- Instructional Techniques for Gifted Learners
- Innovative Classroom Management Practices

The Local Organizing Committee thanks the participants for their contributions to the above sub-themes.

Prof. Gambari, Amosa Isiaka
LOC Chairman/Editor

AN ADDRESS DELIVERED BY PROFESSOR ATSUMBE BERNARD NUMGWO, DEAN, SCHOOL OF SCIENCE AND TECHNOLOGY EDUCATION ON THE OCCASION OF THE SCHOOL OF SCIENCE AND TECHNOLOGY EDUCATION-6TH INTERNATIONAL CONFERENCE ON ENHANCING QUALITY EDUCATION THROUGH INNOVATIVE PEDAGOGY.

Holding from 2nd -5th Of October 2018 at the Centre for Preliminary and Extra Mural Studies (CPES) Federal University of Technology, Minna, Niger State Nigeria

The Vice-Chancellor Federal University of Technology Minna
Deputy Vice- Chancellor (Academics and Administration)
Registrar
Bursar
University Librarian
Keynote Speaker
Lead Paper Presenter
Deans and Directors
Professors
Heads of Departments
Distinguished Participants
Ladies and Gentlemen

It is with deep sense of appreciation to the Almighty God that I welcome you all, on behalf of staff and students of the School of Science and Technology Education to the sixth international conference with the Theme: Enhancing the Quality of Education through Innovative Pedagogy.

The chairman of this occasion, chief host and my hard working Vice-Chancellor and his management team, I want to specially thank you for your unalloyed support for our school. Each time I present our ideas to you as a school, your solemn quiet words **well done just continue** have constantly propelled me to do more and to believe in you. Your support and good will to our school have given us the confidence in organizing this conference annually for the 6th consecutive time at a stretch.

Mr. Chairman distinguished ladies and gentleman join me to welcome our erudite scholar an academic juggernaut and mathematician of great repute. He is our workshop facilitator and the key note speaker of this conference.

He is Professor Marc Shafer professor of Mathematics Education from Rhodes University, South Africa. We are also happy to have in our midst to do justice to the conference theme, (Lead Paper Presenter) Professor Isaac Olakanmi Abimbola, Founder and CEO, Excellent learning Technology limited.

We appreciate your interest in our conference.

The school deeply appreciate and thank our distinguished guests who have always honoured our invitation to be part of this great occasion every year.To our conference participants who have come from various Universities, Polytechnic and Colleges of Education in Nigeria and overseas we say you are welcome.

I congratulate the conference organizing committee members for a beautiful and robust planning that have brought about this large gathering of international, national and local experts in the area ICT application in teaching and learning.

Education is considered the only veritable tool for national and human development as it promote among other things economic, technology and social development. Infact it brings about peace and unity. It is clear and obvious that no human, physical and technological development can take place without quality education. This is because knowledge, skills, wealth, good health and happier relationship are all products of education.

In the words of sultan Sa'ad Abubakar III, education is light and aims at restoring the dignity of man, while ignorance is darkness and leads to poverty.

Despite the good attributes of education and what it can achieve and do for a nation, you will agree with me that the Nigerian educational system is bedeviled with uncountable number of factors that have impeded its growth. Factors such as (i) Poor infrastructural development (ii) Under funding (iii) Poor teaching personnel's (iv) Poor curriculum, poor instructional strategies among others.

As a result of the problems above, graduates of our institutions at whatever level are described as unemployable and unable to express themselves highly deficient in both theoretical knowledge and practical skills.

Mr. Chairman Sir, rather than bemoaning our problems and lamenting over factors that have brought out educational system to its present state, as educational practitioners, we have chosen one of the problems as the main theme of this conference. This is with the aim of proffering solutions:

The theme of this year's conference is " **Enhancing Quality Education Through Innovative Pedagogy**". What then is pedagogy? Pedagogy is the method and practice of teaching, especially as an academic subject or theoretical concept. Pedagogy refers more broadly to the theory and practice of education and how it influences the growth of learners. Pedagogy, taken as an academic discipline is the study of how knowledge and skills are exchanged in educational context and it considers the interactions that take place during learning.

If we agree totally with the definition above then we can safely conclude that an effective teacher must have a range of different teaching and learning tools that can be drawn upon and used in the classroom. For effective learning to take place, the teacher must not only have good subject knowledge but also effective pedagogical skills if they are to get the ideas across to the students. According to Barber and Murshed (2007), collaborated in the National Policy of Education FGN (2013), there is a strong consensus that high performance in education system is dependent on the quality of teaching (no nation can rise above the quality of her teachers)

Mr. Chairman Sir, it is against this back drop that the theme of this year's conference was drawn. "Enhancing Quality Education Through Innovative Pedagogy. Therefore, conference participants must of necessity proffer solutions to problem such mass failure in national examinations (WAEC and NECO examinations), half-baked graduates; graduates that lack knowledge and skills etc. They must also answer the following questions.

- What are the standards in pedagogy
- Effective pedagogy
- Types of pedagogy
- Pedagogical components
- Adaptively in pedagogy
- Pedagogical components
- Criteria for appropriate pedagogy
- Principles of correct pedagogy

How can we overcome these challenges that have almost overwhelmed our educational system. I believe that this conference is a suitable platform for academics, industrialist, ICT guru's, researchers and all stake holders to meet, discuss and come up with strong communiqué that will surmount the problems bedeviling our educational system.

Once more let me express my profound gratitude to the Vice-chancellor and his Management team, our invited guest, the key note speaker and lead paper presenter for finding time amidst their tight schedules to honour our invitation.

To all our participants, I wish you fruitful deliberations at the plenary and syndicate groups. Please avail your selves of the natural beauty of our two campuses and feel at home. Minna the capital of Niger State is a quiet, accommodating and a pleasant city you will love. Please explore it to the maximum. May God grant you journey mercies back home after the conference. Thank you for your attention and God bless you.

AN ADDRESS PRESENTED BY THE VICE-CHANCELLOR, PROF. ABDULLAHI BALA PhD, FSSN AT THE OPENING CEREMONY OF THE 6TH INTERNATIONAL CONFERENCE OF THE SCHOOL OF SCIENCE AND TECHNOLOGY EDUCATION, FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA ON OCTOBER, 2018.

Deputy Vice- Chancellor (Academics and Administration)
Registrar
Bursar
University Librarian
Keynote Speaker
Lead Paper Presenter
Deans and Directors
Professors
Heads of Departments
Distinguished Participants
Ladies and Gentlemen

I want to sincerely welcome everyone present here with gladness of heart on behalf of the Governing Council, Management, Staff and Students of this great institution to the 6th International Conference of the School of Science and Technology Education, Federal University of Technology, Minna. It is no doubt that this yearly organized conference has become a platform for robust academic discourse based on well researched, properly articulated and documented research efforts of individuals, groups and corporate bodies.

This annualconference has created a platform and an opportunity for both local and international community in education and research institutions to share their learning, teaching, research findings and best practices. With various academics coming together to bring their knowledge to bear on ways to enhance science and technology education, there is no doubt about the future of science and technology in Africa and in the world at large. This years' theme "Enhancing Quality Education through Innovative Pedagogy" will better enhance teaching and learning process in science and technology. Thus, this conference provides opportunities for both local and international innovative presentations to bring in thoroughly researched information that will enhance quality education to the benefit to the entire world.

It is no longer news that the educational system especially in Africa is in a state that needs urgent and serious attention. The quality of education is not what it used to be. From different quarters it has being observed that method of teaching has contributed in no small way to the problem of teaching and learning in our various institutions from the primary schools up to the higher institutions. Various stakeholders in education have long for how the situation can be better enhanced. Hence, the topic of this conference is not only timely but wisely.

To give brief background information on the theme of this conference, what is innovative pedagogy? Pedagogy to start with is the study of being a teacher or the process of education. Pedagogy as a science explores the processes by which society deliberately transmits its accumulated knowledge, skills, and values from one generation to another. The

major pedagogical question on the mind of educational stakeholders then is, how to better educate students in our various tertiary institutions? How to enhance students learning and meet the needs of various types of students? To answer the above stated questions, the followings are needed which include among others educational goals set by the student and teacher, strategies or styles of instruction, the educator's own philosophical beliefs, the student's background knowledge and experience, the curriculum, modern technological devices, monitoring and test system.

Innovative Pedagogy is therefore the study of being an innovative educator or the processes of innovative education/teaching. The key question of Innovative Pedagogy is - What are the educational, psychological, organizational factors/conditions that have a formative utmost effect on the mind, character, or physical ability of a student? I believe these questions will be answered in this conference. This is because Innovative Pedagogy as a science and practice has the responsibility to produce students that will be creative and eventually become game changers in the society.

We must understand that majority of our students in todays' world are technologically inclined. They have access to any information possible. They do not require us to "spoon-feed" them. Instead what may be more helpful is to support them as they journey through the World Wide Web in order for them identify those resources that meet their needs. This can only be achieved through Innovative Pedagogy.

This is because the ancient pedagogies which started off as a "sage on the stage" and moved on to a small set of basic teaching methods (instruction, discovery and inquiry) have been extended to become a profusion of pedagogies and their interaction with their own philosophical and pedagogical theories. Hence, education is seen as hugely dynamic and mobile. As educators in institutions of higher learning we must be ready to keep pace of these developments in education.

Also, for Nigeria to achieve her age-old goal of crossing the borderline between being a developing country and a developed country especially, quality education must be a target. As stakeholders in education, we must join hand with the government to design specific policies that create a better environment for innovative teaching.

The emphasis of this conference which is on enhancing quality education through innovative pedagogy will in no doubt add value to education because of the paramount role education plays in achieving national growth and development. In order to achieve sustainable development that meets the needs of the present without compromising the ability of future generations to meet their own needs, educational institutions need to adopt innovative teaching strategies so that the individuals graduating from our institutions can be developed to creative individuals that will add positively to the growth and development of Nigeria, Africa and the world at large.

We mustprepare our children to deal with the ever-shifting economic and political realities of our shrinking planet. To actually build citizens for the 21st century, we must continuously strive to offer instructions that would help students learn to see "through the eyes, minds

and hearts of others". We must be ready to infuse a global educational perspective into their school experiences and give them reasons to appreciate cultural diversityas well as opportunities for survival and sustenance in our inter-connected world, then we would have fulfilled the most important challenging task in education in the 21st century.

The concept of this sixth Conference of the School of Science and Technology Education is hence very commendable. The School has always set the pace for other Schools in the University who are gradually following the trend. I sincerely appreciate the untiring effort of the Dean and the Conference Organizing Committee. Please accept my best wishes for another very successful School of Science and Technology Education International Conference.

Finally, to our distinguished invited guests, resource persons and participants, you are all welcome to this great institution and to the city of Minna.

Please do have a pleasant experience as you take time out of your busy schedule to visit places of interest in the University and Minna city.

Thank you for your attention.

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THE ROAD TO INNOVATIVE INSTRUCTIONAL STRATEGIES AND PERFECT UNDERSTANDING BY STUDENTS

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Introduction

The ultimate goal of education in all countries of the world is provision of quality education to the citizenry at all levels of education. Perhaps, the only limiting factor in the achievement of this ultimate goal is each country's resources. Efforts are on in different parts of the world to discover the appropriate innovative pedagogy that would achieve quality education. It is against this background that any effort made to interrogate our movement in the direction of quality education is commendable.

The purpose of this paper is to raise awareness about a career-long journey, as both an observer and a participant, on the road to finding appropriate instructional and learning strategies that would lead to quality education by way of perfect understanding of learned materials by students. I leave readers, in the end, to conclude if, indeed, a universal solution has been found, or we are close to finding appropriate strategies that could lead predictably to quality education.

First, the paper presents what is considered as an inadvertent wrong focus of research and teaching on what students knew, with little or no regard to what they did not know. Second, is a description of the shift in focus, which led to due attention being paid to students' misconceptions and alternative conceptions, initially without a strong theoretical base, but later appropriate theories were found, which provided a strong explanatory power and a research movement. Third, the evolution of the research movement is described and discussed briefly, and appropriate research works highlighted. Fourth, this leads to a summary of the major findings of the research tradition/movement that spanned about four decades. Fifth, is a description of the continuing search for appropriate, efficient, and effective instructional strategies that have a universal appeal and that could lead to quality education. Sixth, the paper describes a chance encounter with a set of innovative instructional and learning strategies, by the name, Study Technology, which coincides with earlier research tradition highlighted, and stands the chance of having a universal appeal, and may have a predictive power. Seventh, a detailed analysis of the basic tenets of Study Technology and its implications on many aspects of education is carried out. Eighth, the paper concludes with a summary, some concluding statements, and some actionable recommendations geared towards the goal of quality education.

Earlier Focus on Student Achievement

Before the decade of the seventies, within the science education community, there was a preoccupation with studies and practices related to students who were doing well and what they knew, to the neglect of those who did not do well and what they did not know (Abimbola, 1996). A traditional type of achievement study would look at how different groups of students performed on an achievement test. Researchers usually concluded that one group of students performed significantly better than the other group(s) coupled with recommendations for improving instructional practices. It took a long time before researchers started probing further, using new strategies, such as the interview technique, to find out the reasons responsible for the case of those who did not do well, and what they failed to learn. This was where the research focus started shifting to subject matter knowledge and conceptual change. The realization began to dawn on researchers that to improve students' achievement, there was the need to focus attention on subject matter

knowledge, and appropriate strategies could be used to remove what students did not know, or know differently, thereby improving their knowledge of the subject matter.

Later Focus on Student Misconceptions and Alternative Conceptions

Although Stewart (1985) has traced the origin of cognitive science to Newell and Simon's (1972) book on *Human Problem Solving*, he said that researchers could find some of the presuppositions for the theory in the writings of Kant, Hume and some 17th Century philosophers. Cognition is a philosophical term, which means knowledge or something known. Cognitive science, on the other hand, is an interdisciplinary field that brings together researchers in artificial intelligence, epistemology, psychology, psycholinguistics, education, and neurophysiology. Cognitive science borrows ideas from various sources. It borrows ideas from information processing psychology that postulates information processing models of human and machine intelligence. It also borrows ideas from the "new" philosophy of science. This philosophy espouses constructivist views of knowledge that are compatible with cognitive psychology. Cognitive scientists within science education have usually acknowledged, to varying degrees, their indebtedness to Piaget (1979) and Ausubel (1968). The general goal of cognitive science is to construct a theory of human cognitive behaviour. Research on subject matter knowledge and conceptual change has cognitive science as a basis.

White, R. (1987) has put the beginning date of the research paradigm of subject matter knowledge and conceptual change at 1976 with Za'rour (1976), and Nussbaum and Novak's (1976) works. One can also add Okeke (1976) and Taiwo (1976) works to this list of foundation research works. Perhaps, the first study within the research paradigm is Doran's (1972) work that has been usually overlooked (White & Tisher, 1986). Driver's (1973) thesis closely follows Doran's work. However, Abimbola (1984) reviewed studies that predated all the above. Although the studies lacked specific theoretical framework, they looked the same as some of the studies being conducted in the 80s and 90s within the research paradigm under discussion. Examples of these studies are those of Bonnel (1925), Bennet (1927), Caldwell & Lundeen (1931, 1933, & 1934), Bail (1933a &b), Barnes (1943), and Oaks (1942 & 1945), and so forth.

Education researchers in this area of study concentrated on three major areas—problem solving (e.g., Simon, D. and Simon, H. 1978), problem solving combined with conceptual knowledge (e.g., Stewart & Dale, 1981, Abimbola, 1984, Nkpa, 1987, Okeke, 1976, & Taiwo, 1976), and conceptual change (Glasersfeld, 1989).

The stages of the evolution of the research tradition, in an overlapping manner, are as follow (Hewson, M. 1989):

(i) Finding out what subject matter area students find difficult to learn, or teachers find difficult to teach to serve as additional bases for research (Abimbola, 1998; Ahmed & Abimbola, 2011; Finley, Stewart, & Yarroch, 1982);

(ii) Documenting alternative conceptions and/or misconceptions that appear in science (e.g., Aworanti, 1988; Bello, 1991; Bello, In progress; Bello, Z., Bello, G., & Abimbola, 2016; Helm & Novak, 1983; Novak, 1987; Misconceptions Trust, 1993; Obe, 1989; Oyeyemi, 1991; and Soyibo & Akintola,1985);

(iii) The concurrent development of a model of learning as a conceptual change. This model has a high explanatory power: "it serves to explain both appropriate learning and inappropriate learning, and suggests strategies by which knowledge changes in the learning process" (p. 3) (e.g., Hewson, P., 1981, 1982, & 1989; Zietsman & Hewson, 1986);

(iv) Devising teaching strategies to remediate, or reconcile misconceptions and alternative conceptions, respectively (e.g., Hewson, P., 1981; Okebukola, 1986). During this stage, researchers started experimenting with concept mapping, Gowin's V mapping, etc.;
(v) Correlating the existence of alternative conceptions with other theoretically-based observations, such as Piagetian, Ausubelian and Brunerian theories;
(vi) Focus on the origin of misconceptions and alternative conceptions, "the role of language, culture (both inter- and intra-culture), religion and environment in the development of knowledge" (p. 4) (e.g., Abdulsalaam, Abimbola, & Ahmed, 2014; Hewson and Hamlyn, 1983; Olawepo, Abimbola, & Ahmed (2014); and
(vii) Reflective stage: where? What? Why? How? in addition, other questions are asked (e.g., Hewson, M., 1989. Posner, 1989; White, D., 1989; & White, R., 1987).

Summary of Major Research Findings on Subject Matter Knowledge and Conceptual Change

Researchers have conducted several studies worldwide concerning subject matter knowledge and conceptual change in the last four decades. The studies covered content areas in biology, chemistry, mathematics, and physics. In addition, the studies covered all levels of education from primary, through secondary, to tertiary levels. The following is a synthesis of the major findings or conclusions from research studies on subject matter knowledge and conceptual change:

(i) Students do construct a variety of well-founded ideas about numerous science concepts because of their previous experiences and linguistic encounters with their immediate environment. We must therefore consider students as knowing beings. Learning in this context is therefore more than repeating in near verbatim form, what we present to students;
(ii) The learner's existing knowledge is important to subsequent learning;
(iii) Distinct, sometimes contradictory ideas exist simultaneously in individuals. Some individual students cope with this situation by compartmentalizing knowledge in the school situation and everyday knowledge, outside the school environment. In some individual students, this situation may lead to conceptual confusion, whereby students find it difficult to compartmentalize their knowledge. They then allow everyday experiences to interfere with school knowledge. Such students tend, therefore, to view science in a different way from the way the teachers expects them to view it. Such a point of view may sometimes be clearly wrong, i.e., "misconceptions," or, when it is not clearly wrong but just different, they are called, "alternative conceptions;"
(iv) Teachers, too, hold misconceptions and alternative conceptions of science concepts and principles;
(v) Misconceptions and alternative conceptions exist in science textbooks and other curriculum materials;
(vi) Misconceptions and alternative conceptions exist on the internet, mostly in private websites and blogs;
(vii) Some students' misconceptions and alternative conceptions are stable over time, subjects, and contexts;
(viii) A normal instruction is usually not effective in changing students' misconceptions and alternative conceptions to accepted or correct conceptions. However, well-planned instructions employing strategies that take account of students' misconceptions and alternative conceptions will result in the development of conceptions that conform more closely to school science;

(ix) Researchers can collect useful information about students' learning, in part, at least, using interviews. Interviews are particularly effective in probing students' existing knowledge, misconceptions, and alternative conceptions; and

(x) There is need for research that focuses on what students fail to learn. For research to be effective in this area, it must be more descriptive and interpretive to explain what students do not know at all, or what they know differently, or wrongly. Research also needs to focus on students who do not do well at school so that they can do well as others—a kind of "lost sheep" approach to learning.

Searches for Efficient and Effective Instructional Strategies

Researches based on conceptual change model of learning have usually followed the pattern of preparing a special unit, the teaching of which is expected to enable the students change from their conflicting misconceptions and alternative conceptions to acceptable scientific conceptions. Instructions can be designed to effect a conceptual change in the learner, through a three-phase instructional strategy, involving an awareness phase, a disequilibrium phase, and a reformulating phase. This strategy may not produce ***predictable*** students' learning outcomes in the hands of different teachers. Researchers and teachers also used concept maps and Gowin's V maps to improve students' learning outcomes. Other strategies used in the past and currently, which scientists also use are analogies, metaphors, and so forth. A gap in this model is how a researcher can use a strategy that is predictable, repeatable, and universal in effecting a conceptual change in students. This is where study technology provides an answer.

I believe that Study Technology has innovative principles and strategies that have the capacity to guide learners to a perfect understanding of the subject matter contents of school subjects. When I was preparing for my inaugural lecture in 2013 (Abimbola, 2013a), based on my experience from a Master Instructor training programme and my subsequent implementation of it at various levels, I was very sure that I would find copious examples of perfect understanding of students on the internet. However, I found none, except perfect understanding narrated by persons who had gone through near-death experiences. I still went ahead to affirm the possibility of perfect understanding on the part of students and all human beings. Two years later, with the same audacity, I went ahead to publish a book arising from the courseware prepared for a stillborn online Post-Doctoral Diploma in Education (PDDE) (Abimbola, 2015). The unrelenting search for examples of perfect understanding has now yielded 16 examples of situations where different categories of students had perfect Cumulative Grade Point Averages (CGPAs), which are more superior to First Class Honours grade.

Coincidence of Innovative Instructional and Learning Strategies

I experienced a rare coincidence of innovative instructional strategies and innovative learning strategies with Study Technology when I attended a one-week workshop on Study Technology in Lagos from 23-28 August 2004. The Education Trust Fund (ETF) (now Tertiary Education Trust Fund, TETFund), McRae & Co., Lagos, and The Applied Scholastics International, Missouri, USA organized it. It was a coincidence because L Ron Hubbard who was not a mainstream educator introduced Study Technology and the concepts and principles of study technology tallied with almost all the tenets of cognitive science (Abimbola, 2013a). In addition, the concepts of misconceptions and alternative conceptions tally with Study Technology's "misunderstood words."

A follow-up Master Instructor Training workshop took place two years later in Akure, Ondo State, from 13 April to 20 May 2006. Slaughter (2006) defined Study Technology as "a research-based system of learning how to learn, which includes basic principles and

workable methods for application in the field of study" (p. 1). The results of the application of Study Technology are students who know how to learn, how to apply what is learned and are motivated independent lifelong learners. Teachers who know how to use this method become new teachers who know how to teach students how to learn, and they become lifelong learners and teachers who are capable of learning anything and teaching anything, and any type of learner!

Study Technology employs mastery learning principles and the following other principles, strategies, and resources to achieve perfect understanding of students' learning outcomes:

(i) Availability and use of standard, reference, and subject and e-dictionaries for use in clearing misunderstood words, symbols, and situations;
(ii) Availability of course materials, written in logical prose, to facilitate a systematic material-based instruction;
(iii) Availability of checksheet/study guide to achieve a student-centred instruction, with adequate practice, and self-assessment;
(iv) Absence of verbal data—no teaching is involved; the instructor only uses a two-way communication system to re-direct students' attention to where answers are in the course material;
(v) Availability of projection equipment, e.g., multimedia projector, or online resources, that allow for a systematic memorization and learning of materials;
(vi) Availability of demonstration kits and clay work to practice and demonstrate knowledge to facilitate active studying and learning;
(vii) Utilization of twin-ship grouping system to reinforce self-learning;
(viii) Use of Chinese/Qur'anic School system of memorizing definitions, lists, processes, and so forth;
(ix) Learning how to learn and apply knowledge—technology of studying and learning;
(x) Uses two-way communication system during learning sessions and interviews after testing sessions;
(xi) Utilizes on demand examination system, based on students' estimate of their readiness for the examination;
(xii) Uses the misunderstood word for misconceptions and alternative conceptions;
(xiii) Word clearing is in use during studying sessions to increase vocabulary and ensure perfect learning;
(xiv) Employs re-study and repeat examination system;
(xv) Embodies many elements of science literacy; and
(xvi) Study Technology is in continual use

Examples of studies that had investigated and established the efficacy of some of the principles and strategies are: Gbigbadua, Abimbola, & Ahmed (2012), which investigated the effects of pre-instructional word-clearing strategy on achievement in biology among senior secondary school students in Ilorin, Nigeria; Abdulkadir, Abimbola, & Ahmed (2013) investigated the effects of teachers' use of checksheets on senior school students' achievement in Ilorin, Kwara State, Nigeria; and Adeoye and Abimbola ((2016) on the effects of senior school students' use of demonstration kit on their achievement in biology in Omu-Aran, Nigeria, which favoured high-scoring students against other students. Another one is Ahmed, R. (in progress), on effects of study technology learning strategies on senior school students' achievement in ecology in Ilorin, Nigeria.

Efforts had also been made to raise awareness about the applicability of Study Technology in the teaching and learning of students in higher education institutions (Abimbola, 2011), in the initial training of teachers (Abimbola, 2013b), and the use of logical text in preparing

instructional materials meant for improved student achievement in biology (Alabi, & Abimbola, 2018).

The Possibility of Perfect Understanding by Students

The Applied Scholastics International did not expressly state that its principles and strategies would normally lead to perfect understanding by students during the Master Instructor Training Program at Akure, Nigeria. However, all indications pointed in this direction. When putting the training into practice, I discovered that two things were necessary to achieve perfect understanding from students:

(i) Informing students ahead of time that they need to master all materials taught them, such as definitions, lists, processes, and so forth; and

(ii) Actually testing students for mastery of all, that is, if they were given a list of ten things; ask for the ten things in subsequent tests or examinations.

These strategies are not new; the reality is that teachers and examination bodies have been breaching the basic rules of testing for a long time. Instead of requiring students to answer all questions in an essay test, we usually ask such students to answer, for example, three questions from five questions. This is against the traditional rules of testing, which usually require students to answer all questions set for a test or examination. In addition, teachers and examination bodies find it difficult to base assessment on the use of multiple-choice testing, which usually requires students to study widely to be able to do well in tests or examinations.

Study technology provides basic principles and strategies to use for removing students' misconceptions and alternative conceptions (misunderstood words). The only thing that should normally result from these is perfect understanding from students. The following is a description of how this might be achieved comprehensively in the following aspects of education, such as instruction, learning, curriculum development, teacher education, educational research, and educational policy:

(a) Instruction

(i) Teachers should own and use English language dictionaries— hard copies or e-copies to clear words, symbols, or situations whose meanings they do not understand;

(ii) Teachers should own and use standard dictionaries of their subjects, and, in addition, encourage their students to own and use such dictionaries for clearing words, symbols, or situations whose meanings they do not understand;

(iii) Teachers should require students to master all taught contents to be able to recall them whenever needed by the teacher, other examiners, and the students themselves;

(iv) Teachers should require students to answer all essay questions set without giving them options to make learning more challenging for students, and to improve the standard of education;

(v) Teachers should illustrate instructions using concrete objects first, before thinking of alternatives, such as: pictures, movies, demonstrations, demonstration kits, clay demonstrations, and sketching to make instructions more real;

(vi) Teachers should use the Chinese/Qur'anic School method for teaching new concepts, lists of things, or processes to reinforce learning;

(vii) Teachers should embrace material-based instruction using checksheet or course guide, which include the following: word list, reading assignments, assigned tasks or activities, self-assessment by twin partners and spot-checking by the instructor; This method is particularly useful for preparing on-line instructional materials for open and distance learning purposes;

(viii) Teachers should always use projection equipment, flip charts, chalk board, and white board to maintain students' attention; and

(ix) Teachers should select a wide array of new and interesting strategies from *Glossary of instructional strategies* by Kelly Jo Rowan.

(b) Learning

(i) Students should embrace self-discipline to be able to empower themselves, by paying full attention during lessons and avoid distractions completely;
(ii) Students should be made to form themselves into study partnership of twins—a kind of cooperative learning strategy;
(iii) Students should learn how to study and learn through the use of study technology tools;
(iv) Students should master definitions of all key words encountered in a lesson and be able to use them in several sentences to reinforce their mastery;
(v) Students should strive to master all contents taught in a lesson through the use of study technology tools;
(vi) Students should avoid incomplete understanding of learned materials by asking questions always; and
(vii) Students should learn how to apply knowledge learned in each lesson.

(c) Curriculum development

(i) Material-based instruction, which could be in the form of on-line courseware, should be introduced at all levels of education—primary, secondary, and tertiary levels;
(ii) Textbooks, or courseware equivalent, should be available for use in all subjects of the school curriculum;
(iii) Checksheets or course guides should be prepared for all subjects of the school curriculum and instruction should be based solely on them, to make instructions truly student centred;
(iv) Each student should possess a standard English language dictionary for use in clearing all new words, symbols, and situations;
(v) Reference dictionaries should be available for consultation in study technology classrooms; and
(vi) Students should possess standard dictionaries in their school subjects.

(d) Teacher education

(i) Educators should practice material-based instruction with student teachers during their initial teacher education, to enable them learn how to use graded and logically prepared materials, without the use of verbal data in instructions;
(ii) Encourage student teachers to own and use standard English language dictionaries;
(iii) Make reference dictionaries available to students for consultation;
(iv) Encourage student teachers to own and use standard subject dictionaries;
(v) Require student teachers to master all taught contents;

(vi) Practice with student teachers testing and examinations without options;
(vii) Give students opportunities to practice "on demand examination system;"
(viii) Require student teachers to use concrete objects first, before using alternatives, during microteaching and teaching practice;
(ix) Teach student teachers the use of instructional equipment and media, and give them opportunities to practice their use;
(x) Give student teachers practice in the use of Chinese/Qu'ranic school strategy; and
(xi) Expose student teachers to a range of innovative and effective instructional strategies (e.g., Rowan, 2010).

(e) Educational research

(i) Educators should engage in more research on student learning strategies;
(ii) Educators should engage in more research on instructional strategies;
(iii) There should be a close collaboration between postgraduate students and educators in researching into critical areas of need in basic and secondary education; and
(iv) Educators should engage more in extension research work to complement the work of Inspectors of Education in improving the standard of instruction in basic and secondary schools.

(f) Educational policy

(i) There should be a holistic policy on the use of textbooks, course guides, and courseware by basic and secondary school students;
(ii) Governments should institute a policy on textbook-based, course guide-based, or courseware-based instruction;
(iii) Inspectors of education should be extension agents for research and innovations in schools;
(iv) There should be a policy on mandatory attendance at professional development programmes for basic and secondary school teachers;
(v) There should be promotions examinations for all basic and secondary school teachers in Nigeria; and
(vi) Additional qualifications by teachers should attract recognition for promotion purposes.

Summary, Conclusions, and Recommendations

I have made an attempt in this paper to trace the history of the focus of researchers and teachers on what students knew to the neglect of what they did not know. Later on, the focus shifted to what students did not know, and what strategies to use to find them out, leading to a major research movement. I then listed the major research findings from this movement leading to further searches for efficient and effective instructional and learning strategies. I believe that in Study Technology, innovative instructional strategies met innovative learning strategies. I then made a preliminary attempt, with rooms for improvement, to sketch out what we need to put in place in many aspects of education, to achieve perfect understanding from learners.

The major conclusions that are derivable from this paper are as follow:

(a) It is desirable for researchers and teachers to focus attention on both what learners know and what they do not know;
(b) Strategies are available for finding out what learners do not know, or understand, thereby making them easy to remove or ameliorate;
(c) Learners' role in learning is that of construction of knowledge while instructors facilitate learning, without teaching;
(d) Learners' existing knowledge is important in subsequent learning;

(e) All purveyors of knowledge such as learners, teachers, textbook authors, and internet bloggers hold correct conceptions, misconceptions, and alternative conceptions simultaneously;
(f) Some strategies used by scientists to convey their discoveries and inventions are useful for instruction in the school situation; and
(g) Perfect understanding of learned materials is achievable by learners through a whole scale or partial application of study technology principles and strategies.

I hereby make the following preliminary recommendations to guide our efforts to achieve perfect understanding from learners through innovative pedagogy:

(a) Quality education is achievable, if researchers and teachers focus more attention on what learners do not know to enable them achieve perfect understanding;
(b) Teachers and other educators are encouraged to familiarize themselves with the principles and strategies of study technology for their application in the school situation;
(c) Ample opportunities should be provided to learners in the school situation to learn how to learn to enable them construct their own knowledge by themselves;
(d) All purveyors of subject matter knowledge should endeavour to communicate only correct pieces of information through clearing of words capable of being misunderstood; and
(e) All education stakeholders should implement progressively, study technology principles and strategies in schools to achieve quality education.

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CONSTRUCTION SAFETY TRAINING Vie E - LEARNING IN NIGERIAN CONSTRUCTION INDUSTRY IN ABUJA

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Abstract
E – Learning is the learning ways conducted through electronic media, such as CD, auxiliary software, interactive TV. E – Learning safety and health education and training helps to protect workers and prevent property loss caused by occupational disaster. E-learning for safety training and instruction in Nigeria has not been adopted widely in the construction industry. The aim of this paper is to understand the feasibility and current state of application of e – Learning for construction safety training in the Nigeria construction industry and identify its potentials. Therefore, this paper employed interview, test, questionnaire, observation, and document analysis to investigate learning effectiveness. Case studies of five construction organization with e – learning knowledge was conducted. The five construction organizations were selected through snowball sampling techniques. Content analysis was used in other to make effective inference from document content. Significant numbers of people do not have adequate internet services at the moment. Also small organization hurdles includes high quality online safety training services as it is expensive to implement and maintain. It is clear that such IT based e-learning is suitable for many aspects of safety training either as a standalone tool or in a blended approach, but more effort is required to fully utilize its potential. If e-learning is to succeed across the construction industry, there is need to assists mall and medium size companies to access site induction and task specific on line training materials.

Keywords: construction, e – learning, safety, training.

Introduction

The developments through the application of new technologies and innovations within the construction industries have increased the incidence of occupational injury. Domestic safety and health education helps to protect workers and prevent property loss caused by occupational disaster. Carrying out related occupation education and training will enhance workers skill and advance operation safety. According to Chung – Ling &Ren – Jye, (2010), that in Taiwan safety education training was instrumental in reducing the rate of accidents per thousand workers from 4.12% in 2001–3.61% in 2008, a reduction of 14.568%. Developed countries, including US, EU, Japan, and Taiwan have recently begun promoting e-learning to reduce the costs of educational training. Also, E – learning are the learning ways conducted through electronic media, such as CD, auxiliary software, interactive TV etc. The online learning is conducted through the Internet to achieve the interaction among learner, course, and teacher. E-learning indeed is a form of online learning. Therefore, the online learning is called e-learning or web-based learning at present.E-learning for safety training and instruction in Nigeria has not been adopted widely in the construction industry. E-learning has advantages such as flexibility to access the courses from remote construction sites at convenient times and ability for it to self-pace and interrupt the course to suit individual attention spans. Elke & Patrick, (2010), some of the disadvantages of e – learning includes high implementation cost and limited IT familiarities are issues for a large part of the construction industry. Also, availability of appropriate internet access, the need for computer literacy and a willingness to accept e-learning are issues for the learners. The aim of this research is to understand the feasibility and current state of application of e –

Learning for construction safety training in the Nigeria construction industry and identify itspotentials, that is the effectiveness of e – learning.

Literature Review

The "National Code of Practice for Induction for Construction Work" developed by the Department of Occupational Safety and Health (DOSH) of Ministry of Labor and Productivity sets a national standard for different types of induction required on construction sites. It specifies the following 3 modes of delivery:

(i) General induction: 6 hours face-to-face training delivered by Registered Training Organizations (RTOs). Assessment is required.
(ii) Site induction: There is no nominal duration; training should be delivered by a competentperson. No requirement for assessment.
(iii) Task-specific induction: Same requirements as for site induction.

Safety and education training must be provided onsite because construction machines and tools differ as most construction types requires onsite training. Occupational safety and health training embodies instructing workers in recognizing known hazards and using available methods for protection (Alexander & Michael, 1998). According to Chun – Ling &Ren – Jye (2010) that factors such as geographic conditions, time and cost determine whether constructors adopt simpler methods such as video teaching, to achieve a declaration of education training. The e-learning mode can often minimize training time and cost by delivering teaching materials and platform functions via Internet at any time and place (Chun – Ling &Ren – Jye 2010). Bostrom,*et al.,* (1990) argued that assessment of e-learning effectiveness must consider not only actual effectiveness in learning content, but also the attitude of the learner in the network learning environment. Gorman (1995) proposed that e-learning is technology-based training that can increase learning effectiveness.

Research Methodology

This study tested the effectiveness of e-learning for delivering construction safety education training and how to assess its effectiveness. Holcomb (1993) proposed seven methods of assessing learning effectiveness, including interview, test, questionnaire, observation, document analysis, scenario analysis and action plan etc. Therefore, this paper employed interview, test, questionnaire, observation, and document analysis to investigate learning effectiveness. Telephone interviews were undertaken with DOSH representative, registered training organizations and safety professional institute all within Abuja. Case studies of five construction organization with e – learning knowledge was conducted. The five construction organizations were selected through snowball sampling techniques. The key issues investigated in the case study through content analysis included literacy, poor learning, computer literacy, effectiveness of delivery, flexibility, engagement and competency test, In content analysis method numerous materials can be analyzed and explained systematically and statistically. Kerlinger (1985) described content analysis as a systematic, objective, and quantitative research method, its purpose is to measure examine the parameters upon propagating. Weber and Specht (1997) also argued that "the content analysis method is a research methodology, namely a group of procedure to make effective inference for document content.

Results and Discussion

Government Departments' Perspective and Practice of e-learning versus Face-to-Face Training

Recently, Department of Occupational Safety and Health (DOSH) have accepted online delivery as an accredited method for their general induction courses. But most construction companies insist on face-to-face training which is often combined with a video screening or power point presentation delivered by the trainer. Representatives from DOSH stated that the reason for the introduction of online delivery for the general induction safety course was the possibility to get workers through the certification process faster. But DOSH is unable to determine what percentage of general induction cards issued is obtained via e-learning.

Registered Training Organizations (RTO's) E-learning Perspective and Practice

RTOs include training companies and industry associations and group training providers. Telephone interviews were conducted with 5 RTOs delivering general induction training in Abuja in relation to their mode of delivery as shown in Table 1.The largest training company interviewed offer online training courses. Their online packages are well received by their clients. Also, two small training providers prefer face-to-face training. RTOs believe that face-to-face situations are better due to poor internet network and level of workers understanding. Also another, group of training provider and an industry association on't offer online training for general induction, as they believe face-to-face training is more appropriate and provides a better outcome. No blended approach is offered by any provider, which is very successful for applicants with poor English language skills or learning difficulties.

Table1 Interview Summary of RTOs providing General Induction Training

			Course options offered				
RTO	**Type of Organization**	**size of Training Organization**	**online**	**Face – face**	**blended**	**Application using online courses**	**Comments by training provider**
RTO1	Training company	Large	•			100%	Online training is better than face-to-face because the learner can interrupt the online course according to attention span.
RTO2	Industry Association	Medium		•			- There is insufficient internet coverage, - Face-to-face provides a better result than online.
RTO3	Training company	Small		*			Don't know enough about online course to comment
RTO4	Training company	Small		*			Face-to-face is better option because: - Learners can get better assistance if they have questions. - People with learning difficulties can get better help;
RTO5	Group Training Provider	Small		*			Face-to-face is better because, - Learners can get better assistance if they have questions. - People with learning difficulties can get better help, - Better knowledge verification

Source: Researcher Analysis, (2018)

Institute Perspective and Practice

In Abuja, Institute of Safety Professional of Nigeria (ISPoN), play a major part in safety training of apprentices. They provide certified general induction as well as task specific induction. Information on the acceptance of e-learning for task specific safety training by ISPoN teachers and students is difficult to determine as safety is integrated in the overall course. When a teacher in the institute was contacted, the comment was that all the teaching is face – face because most of the teachers are not familiar with e – learning technology. Also, there is resistance to the use of e – learning by the management due to lack of adequate fund and poor internet by serviced provider. The institute was of the opinion that students/apprentices will respond well to e – learning and teaching could be made effective by using a blended approach.

Employer's Perspective

Five (5) construction companies were contacted to gain an understanding of the level of online safety training undertaken by their company. To what extent e-learning is used for site and task specific induction is unclear. Only two large construction companies' has embraced the use of the internet. Lack of response from the rest has resulted in a literature review. A survey by Bloom (2003) on e-learning in Canada lists the use of e-learning for OH&S as the second lowest of 7 categories used in 570 organizations surveyed. Mack Consulting Group (2007, cited in Callan and Fergusson, 2009) investigated the uptake of e - learning in the small business. They found that on-the-job informal training is predominant in the small business sector. Key factors discouraging the uptake of e-learning by small business include the time, cost, concerns about effectiveness and a perceived lack of relevance to their business.

Conclusion and Reccommendation

It is clear that such IT based e-learning is suitable for many aspects of safety training either as a standalone tool or in a blended approach, but more effort is required to fully utilize its potential. As a significant number of people do not have adequate internet services at the moment. Also small organization hurdles includes high quality online safety training services as it is expensive to implement and maintain. Construction training vie e-learning can make a valuable contribution to construction safety. If e-learning is to succeed across the construction industry, there is need to assist small and medium size companies to access site induction and task specific on line training materials. The institute of safety professionals needs to look more closely at the possibilities of overcoming shortcomings of current e-learning approaches for general induction safety.

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TEAM TEACHING AND COLLABORATIVE LEARNING STRATEGIES FOR QUALITY EDUCATION

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Abstract
This paper x-rayed the concepts of team teaching and collaborative learning strategies which are veritable techniques for quality education. Team teaching exploits the power of synergy by consolidating the prowess and intelligence of paired-teachers and paired-lecturers to impart learning or study to students. Consequently, the students gain intelligence and learn from more than one brain, as the saying goes: two heads are better than one. Collaborative learning is an umbrella term for a variety of educational approaches involving joint scholarly intellectual efforts of paired-teachers or paired-lecturers to jointly teach students. It is an educational approach that involves group of teachers or students working together to solve a problem, complete an assignment, or create a product. Team teaching and collaborative learning are basic for quality education. Moreover, quality education is the education that best fits the present and future needs of students. Quality education is paramount in the academic world, hence the need for team teaching and collaborative learning to achieve it.

Keywords: Team Spirit; Team Teaching; Collaborative Learning; Quality Education.

Introduction

In the academic world, lecturers and teachers could be paired with their colleagues to teach and impart knowledge to students in a given subject matter, topic or a course. All teachers at their level can group students to learn among themselves of a particular subject matter, topic and skill in teams either during a class work, group discussion or group assignments. The foregoing are succinctly referred to as team teaching and collaborative learning respectively. Team teaching can been defined as a method of education whereby at least two teachers are expected to work together, for all or significant part of the lesson of a group of students (Ferradáns, 2016).Plank (n.d.) defined team teaching as an arrangement whereby two or more teachers, cooperatively plan, instruct, and evaluate one or more class groups in an appropriate instructional space and given length of time so as to take advantage of the special competencies of the team members. We can, briefly, say that team teaching is a systematic arrangement wherein several teachers optimally use technology

cooperatively, to teach a group of students, varying the size of the groups and procedures with the purpose of instruction, and spending staff time and energy in ways that will make the best use of their respective competencies. Carlo-Olson gave a comprehensive definition of team teaching, according to the author, teach teaching may be defined as an instructional situation where two or more teachers possessing complimentary teaching skills cooperatively plan and implement the instruction for a single group of students using flexible scheduling and grouping techniques to meet the particular instruction". Lee (n.d) opined that team teaching method helps relax and motivate students and enhance their assimilation in class.

According to Marjan and Mozhgan (2012), collaborative learning is an educational approach to teaching and learning that involves groups of learners working together to solve a problem, complete a task, or create a product. In the collaborative learning environment, the learners are challenged both socially and emotionally as they listen to different perspectives, and are required to articulate and defend their ideas. In so doing, the learners begin to create their own unique conceptual frameworks and not rely solely on an expert's or a text's framework. In a collaborative learning setting, learners have the opportunity to converse with peers, present and defend ideas, exchange diverse beliefs, question other conceptual frameworks, and are actively engaged. Dillenbourg (1999) asserted that collaborative learning involves two or more people learning or attempting to learn something together. From these definition, there are three important aspects of collaborative learning: (1) it involves two or more people, as a pair or small group; (2) they learn and acquire new knowledge, that is, they study a particular subject matter and understand the course; and (3) they learn together, this implies interaction between the learners (students) which could be face-to-face learning interaction or computer mediated learning platform. Furthermore, Laal & Laal (2011) and Smith & MacGregor (1993) reported that the collaborative learning is an umbrella term for a variety of educational approaches involving joint intellectual effort by students, or students and teachers together. Usually, students who are working in groups of two or more, mutually searching for clear understanding, solutions, meanings, or creating a product. The collaborative learning activities vary widely, but most center on students' exploration or application of the course or learning material, not simply the teacher's presentation or explication of it.

It should be added that collaborative learning helps students learn more effectively. Although many educationists place a high premium on teaching strategies that go beyond mere mastery of content and ideas, collaborative learning promotes a larger educational agenda, one that encompasses several intertwined rationales.

According to Cerbin (2010) and Panitz (1996), collaboration is a philosophy of interaction and personal lifestyle; it is a personal philosophy, not just a classroom technique. In all situations where people come together in groups, it suggests a way of dealing with people which respects and highlights individual group members' abilities and contributions. There is a sharing of authority and acceptance of responsibility among group members for the group's actions. The underlying premise of collaborative learning is based upon consensus building through cooperation by group members, in contrast to competition in which individuals best other group members. Collaborative learning practitioners apply this philosophy inthe classroom, at committee meetings, with community groups, within the irfamilies and generally as a way of living with and dealing with other people.

Team teaching and collaborative education are indispensable processes for the attainment of quality education. Good quality is very important in education and indeed in any subject matter anywhere. Moreover, Eze (2009) submitted that a good quality in education denotes outstanding standard in education, how good or bad it is, how rich the content is. Quality is

used on every commodity like automobiles, electronics etc. Education can be of high or low quality. Education is the process by which society deliberately transmits its accumulated knowledge, skills and values from one generation to another. It can also be viewed as the process of facilitating learning, or the acquisition of knowledge, skills, values, beliefs, and habits; its methods may include formal or informal discussion, teaching, training, imparting knowledge to learners or students, and directed research. In essence, any experience that has a formative effect on the way one thinks, feels, or acts may be considered educational. According to Kumar & Ahmad (n.d.), education is a purposive, conscious or unconscious, psychological, sociological, scientific and philosophical process, which brings about the development of the individual's potentials to the fullest extent and the maximum development of society in such a way that both enjoy maximum happiness and prosperity. Quality education is the education that best fits the present and future needs of the particular learners in question and the community, given the particular circumstances and prospects. Furthermore, quality education should not be regarded as a process of consumption, but as a process of interaction between teachers and students. Education must aim at giving students the opportunities for personal discoveries, learning, development and self-confidence to adapt to new situations as well as to change these when they find it necessary (Fredriksson, 2004).

Literature Review

The concepts of team teaching and collaborative learning is broadly spreading in various institutions of learnings worldwide, as a method for actualizing quality education through the teaching-learning process. In spite of the fact that it is common in many higher institutions in Nigeria, it is innovative to have two or more lecturers/teachers teach a group of students, or divide the students into study groups to solve a given problem. Succinctly, team teaching is a method of pedagogy delivery where more than one teacher share teaching responsibilities for a particular group of students (Nor *et al*, 2012). The students learn by benefitting from the expertise of different teachers working together – This invariably increase the academic performances of the students. Team teaching emerged as a veritable method of utilizing teachers' prowess to improve the quality of instruction in the school system. Goetz (2000) in Rabb (2009) believed that team teaching could be broadly categorised into two: (1) Two or more teachers collaborating to teach the same group of students, at the same time, in the same classroom, and (2) group of teachers working together but not necessarily teaching the same set of students at the same time or in the same classroom.

According to Nor*et al* (2012), the mandate for quality teaching depends on collective knowledge of teachers and abundance of diverse perspectives which requires the need for collaboration and teamwork in all schools in the country. Hence, the need for building effective teams as a strategic tool for achieving quality education.

Objectives of Team Teaching

The main objectives of team teaching include but not limited to the following;

(i) To enhance the quality of education by collaboration of multiple teachers. According to Rabb (2009) team teaching involves two or more instructors collaborating in a significant way to teach a group of students. Since team teaching involves at least two experts of the subject participating in teaching a specific subject matter or topic, thus they help in enhancing the quality of education and instructions imparted to the students.

(ii) To spark and propel students to attain higher levels of combination on their potentials in their study of new materials (Ferradáns, 2016).

(iii) To make use of better talents and skills of teachers. Team teaching is composed of more than one teachers to benefits the students by the combination of the irintelligence and expertise in the field of knowledge.
(iv) To increase grouping and scheduling flexibility. The team teaching organisation gives flexibility in the grouping of students as indicated by their interests and aptitudes in the subject.

Guidelines and Principles of Team Teaching

The following are some guidelines and principles of team teaching developed by Dalal(2014),thus, educators, teachers, lecturers and researchers should note the following:

(i) Work on establishing the team and assemble the necessary teaching aids as a team.
(ii) Meet regularly to plan and develop course outlines and materials for the lecture.
(iii) Size and composition: The class size and composition of the group for team teaching should be appropriate in terms of learning experiences and purposes of the group. The size of the group may vary depending on the purpose or the goal of team teaching.
(iv) Time factor: Time should be allotted putting into consideration the credit load of the subject.
(v) Learning environment: Learning environment should be provided by making arrangement of laboratory, library, discussion and viewing rooms.
(vi) Duties assigned to students should be appropriate: Team teaching requires proper distribution of duties to the members of the team. The duties should be assigned on the basis of interest, qualification and personality characteristics of the individual member. Selection of members of team should be made very carefully.
(vii) Level of instruction: The level of team teaching must be appropriate to each learner within the group. The initial behaviour of the learners should be properly assessed.
(viii) Supervision: The nature and extent of the supervision of the group's activities depend on the purpose of the group.

Importance of Team Teaching

Dalal (2014), Nor*, et al* (2012) and Plank (n.d.) outlined some of the benefits of team teaching below:

(i) Quality of instruction. Team teaching enhances the quality of instructions imparted to the students.
(ii) Collaborative planning. Team teaching necessitate planning and designing the lecture contents together and assignment schedule appropriately, which are important for quality education (Krometis*et al.*, 2011 in Plank, n.d.).
(iii) The co-planning process of team teaching inspires teachers to integrate their ideas, which ultimately emerge with the strong, most creative lessons (Ferradáns, 2016).
(iv) By diversifying teaching methods and different teachers' expertise, the students are exposed to various teaching styles and delivery.
(v) It make the teachers and students view the subject matter from different perspectives.
(vi) Opportunity for free discussion. During team teaching, all students are given opportunities to express themselves and fully participate in group discussion. Team teaching gives ample opportunity for freeself-expression to all the students of the team.
(vii) Development of human relations: Students need exercise in good human relations in schools. Our present system does not provide enough opportunity to develop good human relations among the students. Team teaching provides such opportunity and trains students in good human relations essential for social adjustment and interaction.

(viii) Development of the professional status of the teacher: Team teaching develops habit of studying new professional literature and demands hard work for the development of their professional proficiency.
(ix) It makes room for breakthrough from a rigidly compartmentalized school organization: Team teaching makes more flexible use of staff, equipment and the school building. It is inspired by the determination to get rid of the traditional method of fixed time table.
(x) Economy: Team teaching is economical method of teaching, time and energy are saved by team teaching and maintaining discipline in the class.
(xi) Evaluation: The students can evaluate the different teaching styles of each teacher and can give suggestions for improvement.

Challenges of Team Teaching

Ferradáns (2016), highlighted some challenges of team teaching to include the following:
(i) Adapting to different teaching styles. Experience has shown it is difficult to work with people whose teaching style, philosophy and approach differ from another. However, it could widen one's exposure to blend differences together and learn by incorporating multiple styles into your teaching experience.
(ii) Teaching out of one's comfort zone and sharing the stage with another might be a problem.
(iii) Part of the challenge of team teaching is putting yourself in a position where your own authority and expertise are challenged, and sometimes you have to take a backseat.
(iv) Nor*, et al* (2012) and Plank (n.d.) also added some challenges of team teaching:
(v) Lack of cooperation: Team teaching is based on mutual cooperation among the members of the team which cannot be always taken for granted. Students hesitate to cooperate for the organization of successful team teaching.
(vi) Team teaching necessitates delegation of power and responsibilities which in most schools is not feasible in practice because the administrator does not want to delegate their powers to any other agency.
(vii) Traditional conservative attitude. Generally speaking, students do not want to deviate from the routine methods prevalent from centuries. They may resist any innovation which may bring new responsibilities. Sometimes they fail to adapt themselves to the new situations and find it more troublesome.

Collaborative Learning

Collaboration is a philosophy of association and individual way of life where people are responsible for their actions, including learning and regard the capacities and contributions of their peers. Collaboration is intended to encourage the achievement of a particular result or objective through individuals working together in groups and cooperating to accomplish a task. Collaborative learning is one of the most widespread and fruitful areas of theory, research, and practice in education (Cerbin, 2010). Roselli (2016), opined that collaborative learning is a construct that recognizes a current solid field, both in face-to-face and virtual education intervened by the new technology.

Laal and Laal (2011) maintained that collaborative learning is an educational approach to teaching and learning which involves teachers or students working together to solve a problem, complete a task, or create a product. Jacobs (2004) submitted that collaborative learning is the instructional use of small groups so that students work together to maximize their own and each other's learning, it is a techniques for helping students work together more effectively. Holistically, collaborative learning is an umbrella term describing variety of educational approaches involving joint studens intellectual effort among

teachers or students. Usually students work together in groups of two or more, mutually searching for understanding, solutions, or meanings, or creating a product (Laal and Laal, 2011; Smith and MacGregor, 1992).

Nuggets of Collaborative Learning Strategies

The following are nuggets of collaborative learning strategies:

(i) Think-Pair-Share. This involves explaining ideas or solution to another student. The teacher or instructor ask a question to the class, the students write a response and then share it with their colleague in the class. Students clarify their position and discuss points of agreement and disagreement. The teacher can draw from the several responses of the students to illustrate important points or facilitate a whole class discussion. The technique keeps students to engage in large class participation, it stimulates class discussion and individual learning participation, and target key concepts in a particular subject for the purpose of review (Cerbin, 2010).

(ii) Reciprocal Teaching. In this method, students teach one another in groups, by jointly reading a text or work on a specific task. The students then takes turns to teach the group a segment of the text of task. This assists the students to jointly read a course material and also stimulates group discussion to clarify segments in the course material (Cerbin, 2010).

(iii) Round Robin Brainstorming. In this collaborative learning method, the class is divided into small groups of 4 to 6 students per group with one person appointed as the recorder. A question is posed by the teacher with many possible answers and students are given time to think about answers. After the "think time", members of the team share responses with one another round robin style. The recorder writes down all the answers of the group members. The person next to (clockwise) the recorder gives their answer and the recorder writes it done then the each person in the group in order (clockwise) gives an answer until time is called. This method helps students to think and learn fast.

(iv) Think-Aloud Pair Problem Solving (TAPPS). This technique is primarily used to solving problems. Students work in pairs and alternative roles. For each problems, a student is selected to solve it while the others listen. The solver thinks aloud – narrating his/her reasons process, while solving the problem. Furthermore, the listeners prompts the solver to keep talking and demand for clarifications. The advantage of this method is that emphasizes process to solution rather than the end result. In addition, students practices formulating ideas, identifying gaps and errors in understanding.

(v) Group Writing Assignments. This involves collaborative work that culminates in a group-authored documents. The teacher or instructor assigns students to groups to write and submit course-related topics and create study guides for the course. The technique helps students to develop and revise ideas. It also helps students work in a group with their colleagues.

(vi) Group Minute Review. This method is used when the teachers stop any time during a lecture or discussion and groups the students into groups or teams, to review what has been taught in the class hitherto with their group. Students in their groups can ask a clarifying question to the other members and receive an answer from various point of view.

(vii) Cooperative learning strategies does not only improve students learning performance, but are also very effective in fostering social development and instilling values of cooperation and interrelationships among students (Sonthara and Vanna, 2009). Thus, these strategies are helpful tool for cognitive and social development. Collaborative learning leads to good quality education. In collaborative learning, students are challenged both educationally, socially and emotionally as they listen to different perspectives from their peers, and are required to articulate and defend their ideas which broadens their intellect. Consequently, the students begin to create their own unique conceptual frameworks and not rely solely on an expert's or a text's framework (Laal and Laal, 2011). Cooperative learning involves more than just asking students to work together in groups, it advance to helping students formulate ideas and develop themselves (Jacobs, 2004). Other significance of collaborative learning for quality education includes the following:

(a) Increased academic learning
(b) Increased critical thinking ability
(c) More time spent on learning tasks (less day dreaming)
(d) Increased student understanding and retention
(e) Increased student motivation to learn
(f) Enhanced student satisfaction with their learning experience
(g) Reduces disruptive behavior in the students
(h) Develops peer relationships among students
(i) Promotes students' self-esteem
(j) Improves students attitude towards school
(k) Empowers the students to share information and effectively communicate orally
(l) Develops listening skills in students

Team Spirit on Collaborative Learning

Team spirit plays an important role in quality education. When different people come together to solve a problem with a common goal in mind is called team spirit. Team spirit therefore is willingness to cooperate and work with people as a team (Emplo, 2017). Team spirit assist in getting successful results in team teaching and collaborative learning. It encourage individuals to work in a group rather than seclusion. Team spirit fosters students in a group to work cooperatively and contribute to the group with ideas, suggestions and effort (Ralea, n.d.). It should be added that when students in a class or group work together to accomplish a task, every member of the group benefits, since they work together, each member contributes to ensure the success of the process. According to Silver (n.d.), team spirit is the sense of unit of enthusiasm for mutual benefits and responsibilities, as planned among a team of individuals, for a given task, cause or endeavour.

Tarricone & Luca (2002) opined that for a successful teamwork to take place, the member should have the following attributes: (1) commitment to the team success and shared goals, (2) interdependence on each other, (3) interpersonal skills, which include the ability to discuss matters openly and frankly with team members, honesty and trustworthiness; (4) vertical communication and positive feedback (5) individual's responsibilities and roles to perform in the team; and (6). Commitment to team processes, leadership and accountability.

Team spirit is a bond among group members which promulgates strength, unit, reliability, trust, and support for the success of the cause for which the group stand to accomplish. Team spirit is the lubrication that ensures the smooth efficient and effective functioning of a team. Team spirit have been a major part of life, not only in teaching or learning but also

any venture where success is paramount. Some of the benefits of team spirit in collaborative learning outlined by to Silver (n.d.) include the following:

(i) It creates synergy in which the resultant efforts of the teachers or students is greater than the parts.
(ii) It supports a better way for teachers or students to learn and work together to solve a problem.
(iii) It encourage multidisciplinary work and division of labour.
(iv) It fosters dynamism and responsiveness, especially the ability to response to change.
(v) It promotes the sense of achievement, equity and friendship among the students.
(vi) It is the better way for teachers and students to work in a group when properly managed.
(vii) It makes work faster than individual work.

The ability for teachers and students to work together as part of a team is an important skills in education today. Academicians or scholars are alwayslooking for likeminded individuals to pair-together, co-author research articles and also handle class room teaching engagement together. Similarly, students too enjoy studying, learning and working together with their colleagues who can contribute their own ideas to create and develop projects for better quality (Tarricone& Luca, 2002).

Conclusion

This study identified that collaborative learning and team teaching greatly enhance the quality of education. Collaborative learning practice provides opportunities to students to learn together and acquire knowledge in group learning (Sonthara and Vanna, 2009). During cooperative learning activities, each student in a group is responsible not only for learning what is taught, but also for helping team-mates learn, thus, creating an atmosphere of quality education. Furthermore, through group discussion and assignments, students work until all group members successfully understand and complete it. This helps the students togain from each other mutually and carry all group members along in the learning activities. All students are actively engaged in learning task. Consequently, students become more active participants in their own learning, as opposed to passive recipients of knowledge who only listen, observe and take notes. It teaches students to work together with their mates and assist them in group rather than to compete against one another. Collaborative learning helps students who are slow learners among them to become quick learners. Finally, the problems-solving approach incorporated in collaborative learning and team teaching ultimately leads to good quality education, thus, building the intellectual capacities of teachers and students for sustainable development of the nation.

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A STUDY OF THE INFLUENCES OF HOME ENVIRONMENT ON ACADEMIC PERFORMANCE OF SENIOR SECONDARY SCHOOL CHEMISTRY STUDENTS IN NIGER STATE, NIGERIA

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Abstract
The research analyses the influence of home environment on the academic performance of Senior Secondary School Chemistry Students in Niger State. A survey design was used. The population of the study was five thousand five hundred and fifty (5,550) students. The sample for the study was four hundred and fifty students drawn from six public schools and three private schools. The selection of students for the administration of the questionnaire was done randomly through haphazard selection of sample. This involves selecting students at random, as you encounter them. The research instrument was the influence of home environment on the academic performance of secondary school chemistry students, Questionnaire (IHEAPSCSQ). There are three research questions and three hypotheses that were tested at 0.05 Level of Significance. The results revealed that there was significant difference between Parental Level of Education and the Academic performance of Senior Secondary School Chemistry Students in Niger State. There were also significance differences between Family Cohesion and Parental Religious Belief and Academic Performance of Senior Secondary School Chemistry Students in Niger State. It was concluded that Parental level of Education, Family Cohesion and Parent Religious Belief influence Performance and Achievement of a child.

Introduction

Children are supremely important assets of the society. Every child is unique. Children are what the whole process of education is centered around. All round development of the personality of children are the ultimate goal of education and therefore, the learning experiences provided to them contributes toward the achievement of this end. Right from the birth, the child is much influenced by all those factors, which surround him. Two factors that influence most directly on the nature and quality of children's educational experiences and development is the family and the school, (Belvi, 1990).Families differ seriously in structure and functioning. Differences exist also in school and in children themselves. Given this diversity in families, there is a need to understand how children's experience within the family contributes to their educational outcome. The academic performance of any child cannot be separated from the home environment in which the child grows up. A healthy home environment offers emotional security to a child.

Educated parents will always express the belief that it is important to help a child with his or her home work and to review the school work that the child had done but a child from an uneducated home environment to a large extent is deprived of such opportunities and thus, he or she struggles to survive the teaching and learning process. A student in this category is therefore not confident and consistent. Hence he or she experiences low academic performance hence, the motivation of any intelligent child towards learning is being accelerated by the positive influence of his or her environment. Therefore, no matter what

we do inside the school, we cannot make a significant impact in without the support of the family, (Chukwuemeka, 2013). Several other research studies and publications cite family characteristics that promote resilience, academic achievement, and healthy development.

These family attributes include: Positive parent-child relationship (i.e., parental closeness, warmth, limit setting, and involvement); Family cohesion, warmth, clear and supportive relationships, absence of discord, and active engagement (i.e., participation in school and class activities, reading to children daily, and helping with homework); Consistent supervision, discipline and responsibilities; and Expressing high expectations for academic success (Bernard., 2004).

According to Bernard (2004), the aforementioned family attributes are associated with: (a) improved student morale and academic achievement within all subject areas; (b) increased school attendance; (c) decreased student dropout, delinquency, and pregnancy rates; and (d) increased self-efficacy, self- worth, and positive social relationships of students. In summary, home environments characterized by positive parenting practices, secure and stable environments, involvement in school activities, and having high expectations for youth, serves as a protective factor countering some of the risk factors these children encounter.

Sjogren (2002) emphasized that youths from poorly educated parents are sensitive to economic incentives since they are to a greater extent attracted to occupations with high wage rates and high return in education. Joyce (1998), stated that educational status of parents affect the demand they make on their children, she added that elite parents understand the role of individual differences among their children this help them to accommodate and encourage their children.

In addition, Sticht and Weinstein-shr (2005) found that children's achievement in school was directly correlated with the mother's level of education, as mother is usually the first teacher. Furthermore, constructing conversations, talking about books and pictures in those books, telling bedtime stories, reading aloud, and asking questions are important steps towards developing the children's literacy skills. They cites research that shows how parent-child interaction affects students learning and how such interaction is especially valuable where literacy in a foreign language is new to both parent(s) and child.

Parental education level is an important predictor of children's educational and behavioral outcomes (Davis-Kean, 2005, MC Courtney & Taylor, 2002). Literate parents have interest in their outdoor assignment and they supervise these assignments. Griffin (1996) shares an opinion that parental participation is of great importance in determining the pupil's performance. For example, well-educated parents tend to provide their children with educationally stimulating environment by encouraging them to study and have access to relevant books and related literature.

King and Furrow (2004) discuss that both academic achievement and the ability to be socially competent is associated with religious involvement. Overall, these researchers found that coming from a religious family is related to an adolescent's healthy development, such as the ability to be successful in school. These individuals are able to connect better with the school environment, engage better with their academic studies, and achieve higher than their counterparts.

Religion is also related to how well an adolescent is able to achieve academically. For instance, McCullough and Willoughby (2009) found that religion within a family is associated

with higher self-regulation and self-control within an individual, and are important indicators of academic achievement. More specifically, students with higher self-control are more psychologically adjusted, have better relationships, and perform better academically. Furthermore, self-control is associated with better academic performance and higher intelligence. Additionaly, religiousness within a family can promote the ability for an individual to delay gratification, which has been linked to better future social adjustment and academic achievement within school (McCullough & Willoughby, 2009).

Statement of the Problem

Every single material thing in the universe is a Chemical, the ability to understand and manipulate these Chemicals is responsible for everything that are used at home from modern food and drugs to plastic and computers. Without the knowledge of Chemistry, the world would be a far more mysterious place and far, far less advanced place (Wikki Answers, 2004). It is therefore disgusting to see the poor performance of Senior Secondary School Students in Sciences especially Chemistry. Recurring year in - year out in WAEC and NECO (WAEC, 2015 & NECO, 2016).The responsibility of training a child always lies in the hand of the parent. It is not out of place to imagine that parental socio–economic background can have possible effects on the academic achievement of children in school. Whatsoever affect the development of the environment of children would possibly affect their education or disposition to it. Parental status is one of such variables. A careful perusal of these statements suggests a likely relationship between home background factors and students' achievement in academics. The question now is– to what extent does home background factors influence academic performance of Senior Secondary School Chemistry students in Niger State, Nigeria.

Purpose of the Study

The purpose of the study was to determine the influence of Home Environment on Academic Performance of Senior Secondary School Chemistry Students in Niger State, Nigeria.
The study strived to achieve the following objectives:

(i) To determine whether parental level of education has any influence on the academic performance of senior Secondary School Chemistry Students in Niger State.
(ii) To determine whether family cohesion has any influence on academic performance of Senior Secondary School Chemistry Students in Niger State.
(iii) To determine whether parental religious belief has any influence on academic performance of senior secondary school chemistry students in Niger State.

Research Questions

For the purpose of this research, answers to the following research questions were pursued.

(i) Is there any significant difference between parental level of education and academic performance of Chemistry Students in Secondary Schools in Niger State?
(ii) Is there any significant difference between family cohesion and the academic performance of Senior Secondary School Chemistry students in Niger State?
(iii) Is there any significant difference between parental religious belief and Academic performance of Senior Secondary School Chemistry students in Niger State

Null Hypotheses

The following null hypotheses were formulated and tested at 0.05 levels of significance.

Hypothesis One (Ho_1): There was no significant difference between parental level of Education and the Academic performance of Senior Secondary School Chemistry Students in Niger State.

Hypothesis Two (Ho_2): There was no significant difference between family cohesion and Academic performance of Senior Secondary School Chemistry Students in Niger State.

Hypothesis Three (Ho_3): There was no significant difference between parental religious belief and Academic performance of Senior Secondary School Chemistry Students in Niger State.

Significance of the Study

The research will be useful to the teachers as well as to the students including parents and the educational bodies.It will enable the teachers to know how the school and home should interact and assist to improve the educational performance of the children in general.The findings will be useful to the government and curriculum planners to know how to inculcate the parents in even the management of the school, as they are important in the academic performance of their children.

Scope and Delimitation of the Study

The scope was Senior Secondary Schools in Niger State. This included both public and private Senior Secondary Schools. Niger state is made up of three geopolitical zones, which include Niger East, Niger North and Niger South. The state covers the total area of 76,363sqkm (29,484sqm).

Research Design

The research design used in this study was the survey design. This was because the opinion of the students and parent on certain items of the questionnaires was the concern of this study. The cross sectional survey type of design was used because of its suitability to collect descriptive data once at a time from the respondents (Sambo, 2005).

Population of the Study

The population of this study was made up both public and private secondary schools in Niger State. There was a total number of 764 Secondary Schools, both (public and private) Schools (SUSEMB, 2015). The population of the study was five thousand five hundred and fifty Chemistry Students from the schools mentioned above.

Sample and Sampling Technique

The sample for this study was four hundred and fifty Chemistry Students (450) drawn from six (6) public and three (3) Private Secondary Schools in Niger State. Nine Secondary Schools will be purposively selected from the three Senatorial zones of the State. These Zones are Niger North, Niger East and Niger South. Two Public schools and one Private School were selected from each zone. The Schools selected wwa based on the provision of well-equipped Chemistry Laboratory.The 450 Students will be selected randomly through a hat draw method. They will the Students to be surveyed. The first term Chemistry result of Senior Secondary School (SSS) III Students will be used to compare the result of the Survey. This will be the result of the same Student that have been Surveyed.

Research Instrument

The instrument used for collecting data in this study was a structured questionnaire. The questionnaire was titled; The Influence of Home Environment on the Academic Performance of Secondary Chemistry Students Questionnaire (IHEAPSCSQ).

The questionnaire was divided into two Section A and B. Section A require students to supply their Biodata while Section B consist of twenty five (25) items to be responded to. The questionnaire was a five point likert questionnaire with items to be responded to on the

basis of Strongly Agreed (SA), Agreed (A), Undecided (U), Disagree (D), and Strongly Disagreed (SD)

Validity of the Instrument

An expert in Science Education from the University of Abuja was requested to validate the instruments in order to discover its validity. In order to establish content validity, results from the ratings were computed using this formula, Content Validity Index (CVI).

$$CVI = \frac{\text{number of items rated as relevant}}{\text{Total number of items in the questionnaire}}$$

The answer divided by 100 to get the percentage of the validity. The Content Validity of this questionnaire is 82.2%, which means that the content is highly validity.

Reliability of the Instrument

The pilot study was conducted in Government Secondary School Minna which is not part of the Schools to be Surveyed, to enable the researcher assess the clarity of the questionnaire items so that those items found to be inadequate or vague could be modified to improve the quality of the research instrument thus increasing its reliability. The split half technique of reliability testing was employed; whereby the pilot questionnaires were divided into two equivalent halves and then a correlation coefficient for the two halves computed using the spearman Brown prophesy formula. The coefficient indicates the degree to which the two halves of the test provide the same result and hence describe the internal consistence of the test. The Coefficient of reliability was found to be 0.80. This shows that the instrument was reliable.

Administration of the Instrument

The researcher first visited the all the sampled schools for study to seek permission to use their school for the study. Permission was granted and the research was introduced to the teachers concerned. The research questionnaires were later taken for distribution to both students and parents to answer. The researcher went back for the questionnaires after a week to enable the respondents answer the questions well at their convenient time.

Method of Data Analysis

Frequency counts of the responses were then obtained, to generate descriptive information about the respondents that participated in the study and to illustrate the general trend of findings on the various variables that were under investigation. This involved the use of percentages, tables and charts. The hypothesis will be analyzed using analysis of Variance Statistic (ANOVA). This is because the instrument for data Collection shall fall within an interval measurement Scale.

Results

Hypothesis One (Ho_1): There was no significance difference between parental level of Education and the Academic performance of Chemistry Students in Senior Secondary School in Niger State.

Table 1: Summary of t-test analysis of parental level of education and the academic performance of chemistry students in senior secondary school in niger state

Group	N	df	Mean	SD	t-value	p-value
Effects of Educational Qualification of Parents	7		393.98	27.94		
		8			.036	.000
Level of Education	3		76.00	86.09		

Table 1 shows the t-test analysis of Parental Level of Education and the Academic Performance of Chemistry Students. The mean scores were 393.98.00 and 76.00 respectively. The t-value of .036 and p-value of .000 was significant at 0.05 level. This indicate that there is significant difference between the mean scores of Parental Level of Education and the Academic Performance of Chemistry Students (t=.036, df=5, p=0.000). Hence the hypothesis was rejected.

Hypothesis Two (Ho_2): There was no significance difference between family cohesion and Academic performance of Chemistry Students in Senior Secondary School in Niger State.

Table 2: Summary of t-test analysis of family cohesion and academic performance of chemistry studentsin senior secondary school in Niger State

Group	N	df	Mean	SD	t-value	p-value
Influence of Family Cohesion	4		341.00	77.22		
		5			.579	.010
Status of Family	3		76.00	95.69		

Table 2 shows the t-test analysis of family cohesion and academic performance of chemistry students. The mean scores were 341.00 and 76.00 respectively. The t-value of .579 and p-value of .010 was significant at 0.05 level. This indicate that there is significant difference between the mean scores of family cohesion and academic performance of chemistry students (t=.579, df=5, p=0.010). Hence the hypothesis was rejected.

Hypothesis Three (Ho_3): There was no significance difference between parental religious belief and academic performance of Chemistry students in Senior Secondary School in Niger State.

Table 3: Summary of t-test analysis of parental religious belief and academic performance of chemistry students in senior secondary school in Niger State

Group	N	Df	Mean	SD	t-value	p-value
Influence of parental religious belief	6		330.92	35.92		
		7			.023	.001
Types of religion	3		76.00	105.96		

Table 3 shows the t-test analysis of parental religious belief and academic performance of Chemistry Students. The mean scores were 330.92 and 76.00 respectively. The t-value of .023 and p-value of .001 was significant at 0.05 level. This indicate that there is significant

difference between the mean scores of parental religious belief and academic performance of Chemistry Students (t=.023, df=5, p=0.001). Hence the hypothesis was rejected.

Summary of Results

(i) There was significance difference between parental level of Education and the Academic performance of Chemistry Students in Senior Secondary School in Niger State.
(ii) There was significance difference between family cohesion and Academic performance of Chemistry Students in Senior Secondary School in Niger State.
(iii) There was significance difference between parental religious belief and Academic performance of Chemistry Students in Senior Secondary School in Niger State.

Discussion of Results

There was no significance difference between parental level of Education and the Academic performance of Chemistry Students in Senior Secondary School in Niger State. Egunsola (2014) who used ex-post facto and correlation survey to investigate the influence of home environment on academic performance of senior secondary students in Adamawa State showed that parental educational qualification, occupation and home location were highly correlated with students' academic performance while parental economic status (income and affluence) have moderate correlation but all the independent variables have significant influence on students' performances in Agricultural Science at the secondary school. It corroborates with the findings of Sticht and Weinstein-shr, (2005) who found that children's achievement in school was directly correlated with the mother's level of education, as mother is usually the first teacher. (Davis-Kean, 2005).

There was no significance difference between family cohesion and Academic performance of Chemistry Students in Senior Secondary School in Niger State. This was supported by Paramasivam and Mani (2013) when they carried out a study to find out the influence of home environment on achievement in chemistry among higher secondary students. The study indicates the existence of significant positive relationship between the home environment and achievement in chemistry of higher secondary students. Further it also highlights Independence, Cohesion and Active Recreational Orientation Dimensions of Home Environment predicts the Achievement in Chemistry of higher secondary students.

There was no significance difference between parental religious belief and academic performance of Chemistry students in Senior Secondary School in Niger State. This corroborates with the studies of McCullough and Willoughby (2009) who found that religion within a family is associated with higher self-regulation and self-control within an individual, and are important indicators of academic achievement. More specifically, students with higher self-control are more psychologically adjusted, have better relationships, and perform better academically.

Conclusion

It was concluded that parental level of Education, Family Cohesion and Parental Religious Belief or Involvement are some environmental factors that can influence the academic performance of Senior Secondary School Chemistry Students in Niger State. It is a popular and important assumption that families prepare and reinforce the symbolic attribution required by School and that School builds upon and elaborates the symbolic resources derived from family membership. Hence, the two factors that influence most directly on the nature and quality of children's educational experiences and development is the family and School.

Recommendations

The authorities should provide and retain qualified teachers and provide adequate teaching and learning facilities and equipment to schools. Teachers preparation program should be student centered. Affective and cognitive teaching strategies should be interwoven during chemistry teaching and learning since both have impact on chemistry reasoning. Chemistry laboratories should be established in all the school system. Both teacher and students should be involved in the design of teaching and learning materials. The language in which chemistry tests are written must be simple an in all cases within the level of the ability of students in English language.

The use of questions in teaching and learning of chemistry is very vital and their importance cannot be emphasized. So, asking questions aids in developing independent learning skills. This is because questions are usually asked by teachers, students and also generated in textual materials. More opportunities for students to actively participate in the analysis of problems will improve confidence in solving chemistry problems, through the mastery of good skills of questioning by teachers and students.

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THE USE OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) FOR SERVICE DELIVERY IN SELECTED FEDERAL UNIVERSITY LIBRARIES IN NORTH CENTRAL NIGERIA

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Abstract
Information and Communication Technology (ICT) in university libraries exist to transform all library operations and services that were hitherto carried out manually. This paper explored the use of Information and Communication Technology (ICT) for service delivery in selected Federal University Libraries in North Central Nigeria. Two research questions and one hypothesis guided the study. Descriptive survey research design was adopted and the population comprised sixty six (66) academic librarians delivering various services in Federal University, Lafiya (16), Federal University, Lokoja (23) and University of Abuja (27). Questionnaire was used as data collection instrument. Descriptive statistics was used to analyse the demographic variables as well as data generated from research questions, while, inferential statistics of Pearson Product Momment Correlation (PPMC) was used to test the null hypothesis at 0.05 level of significance. Findings from the study revealed that academic librarians in the studied university libraries were not using numerous ICT for service delivery. Also, it has been revealed that the academic librarians were not delivering most of the library services using ICT. Furthermore, the study has established that there is a positive relationship between the use of ICT and service delivery in the university libraries studied. The study recommended the need for management of universities and the libraries in North Central Nigeria to ensure adequate provision of modern ICT, supply of alternative power by providing standby generators and adequate subscription of bandwidth and internet service that would enable academic librarians use ICT for effective and efficient service delivery.

Keywords: Information and Communication Technology, Service Delivery, Federal, University, Libraries, North Central, Nigeria

Introduction

University libraries in Nigeria, like their counterparts in other countries are on the process of adjusting their activities from the custodians of printed information materials to providers of digital information services and electronic materials as a result of the development and adoption of ICT. Ozioko, Ezeani and Omeje (2010) maintained that, ICT integration have transformed provision of library and information services rendered to users which were done manually in previous years. ICT according to Idi (2015), comprise digital technologies such as computer and its accessories (hardware and software); communication technologies such as television, radio, telephone; network technologies which include local area network, wide area network, Internet, wireless; and reprographic technologies such as printer, photocopier, camera, scanner, bar code reader, among others. During the preliminary study, the researcher discovered that some university libraries in North Central Nigeria have acquired and adopted ICT facilities to some extent, but despite the huge amount of money spent on these facilities and the anticipated benefits they have in the libraries, the facilities were under utilised for effective service delivery. This study will therefore, investigate the use of ICT for service delivery in selected Federal University Libraries in North Central Nigeria.

Statement of the Research Problem

The development and application of ICT in libraries came as a saviour to the numerous predicaments bedeviling operations and services of the libraries. This is because; ICT have helped in acquiring quality information from variety of electronic devices in a speedy and easy manner, as well as facilitates reformatting of data using different sources (Saleem, *et al*., 2013). However, preliminary investigation conducted by the researcher through personal observations and interacting with both academic librarians and users' (students and lecturers) of the selected federal university libraries in North Central, Nigeria is that, most of them do not patronise their university libraries, rather they preferred to search for information through Google and other search engines using their personal computer systems and mobile phones. The question is: do academic librarians use ICT to provide effective, efficient, and reliable information services in these libraries? Are all the services delivered using ICT? It is against this background that this study would investigate the use of Information and Communication Technology (ICT) for service delivery in selected Federal University Libraries in North Central Nigeria.

Research Questions

The following research questions guided the study:

(i) What is the level of usage of ICT for service delivery in selected Federal University Libraries in North Central Nigeria?

(ii) What are the services delivered by ICT in selected Federal University Libraries in North Central Nigeria?

Research Hypothesis

The hypothesis was tested at 0.05 level of significance.

Ho_1: There is no significant relationship between ICT use and service delivery in selected Federal University Libraries in North Central Nigeria

Literature Review

Various scholars have reported contrasting views about the use of ICT in university libraries in Nigeria. Enakrire and Ocholla (2017) surveyed Nigeria and South African academic libraries use of ICT for knowledge management.The analysis of the study revealed that computers, printers, scanners, CD ROMs, projectors and telephone were the most used ICT resources in the studied academic libraries. Other facilities include monitors, CCTV, Wi-Fi, online databases, microphone, cameras and e-catalogues. Abba and Adamu (2015) investigated the state of ICT adoption in Adamawa State University (ADSU), Mubi Library. Survey research method was used. Responses show that majority (54.4%) of the respondents indicated that ICT available in the library were not used in delivering different services of the library, except in search / retrieving services. Aba, Ezeani and Ugwu (2015) conducted a study to ascertain the use of computer technology on circulation services in North Central, Nigeria. Grand mean of 2.88 showed that ICT were highly used for circulation services in the libraries.

Furthermore, Mamman (2015) studied utilisation of ICT in public library services in Nigeria. The study shows a poor usage of ICT facilities in library operations as revealed in the mean scores of the listed items, which were far below the accepted criterion of 2.50. All the library operations had ICT used to a low extent. Butt, Qutab and Mahmood (2011) conducted a study to determine the use of Internet in library functions in Lahore University Library, Pakistan. The findings from the study revealed that ICT were used in carrying out the functions of acquisition, reference, current awareness services and selective dissemination of information. Other services include cataloguing and classification, document delivery and

interlibrary loan services. The study further reveled that Internet had enhanced information service delivery and saves time.

Omekwu and Eruvwe (2014) conducted a research on application of ICT in Delta State Polytechnic Libraries, Nigeria. The study had four research questions, while the population of the study consisted of 94 librarians such as professionals, paraprofessionals and system analyst working in 3 polytechnic libraries in Delta State, Nigeria. The study revealed that library services such as CAS, SDI, bibliographic searches, displays, indexing and abstracting services, circulation, interlibrary loan and referral services among others were relatively low on the application of ICT facilities in the libraries studied. Gama (2013) surveyed ICT facilities applied for provision of reference information Service (RIS) in Northwest zone university libraries, Nigeria. The results of the study indicated that, the most commonly used ICT facilities were photocopier machine, CD ROM technology and emailfor providing reference information services,SDI services and responding to reference queries and referral services respectively. Ezeani (2010) in a study revealed that the use of computer technologies in circulation sub-system of libraries is inevitable for effective and efficient performance of information service delivery.

Methodology

The design for this study was a descriptive survey research design. The target population was seventy five (75) academic librarians delivering various services in Federal University, Lafia (19); Federal University, Lokoja (24) and University of Abuja (32). Because of the manageable size of the population, total enumeration called census was used; hence, the entire population was used for this study. Questionnaire was used as the research instrument and data collected was analysed using descriptive statistics and inferential statistics. Descriptive statistics was used to analyse the demographic variables such as age, sex, institutions, rank of respondents as well as data generated from research questions 1-3,while, inferential statistics of Pearson Product Momment Correlation (PPMC) was used to test the null hypotheses at 0.05 level of significance.

Data Analysis

Seventy five (75) copies of questionnaire were administered and sixty six (66) copies representing 88.0% were filled, returned and found usable for the study.

Table 1: Level of usage of ICT for service delivery in selected Federal University Libraries in North Central Nigeria

S/No	New Media	N	VH 4	H 3	L 2	VL 1	FX	$\bar{X}$	SD
1	Computers	66	19	42	1	4	208	3.15	0.73
2	OPAC	66	15	19	28	4	177	2.68	0.90
3	CD-ROM facilities	66	12	19	15	20	155	2.35	1.10
4	Online databases	66	8	20	15	23	145	2.20	1.06
5	e-journals	66	13	15	22	16	157	2.38	1.06
6	e-books	66	6	15	32	13	146	2.21	0.87
7	Library application software	66	14	9	24	19	150	2.27	1.10
8	Television	66	4	10	28	24	126	1.90	0.87
9	Radio	66	5	13	28	20	135	2.05	0.90
10	Telephone / GSM	66	5	37	21	3	176	2.67	0.69
11	LAN	66	10	37	19	0	189	2.86	0.65
12	Wireless technology	66	7	11	31	17	140	2.12	0.92
13	Internet	66	11	39	11	5	188	2.85	0.79
14	Printer	66	10	39	14	4	189	2.82	0.76

15	Scanner	66	15	26	21	4	184	2.79	0.87
16	Photocopier	66	22	44	0	0	220	3.33	0.47
17	Projectors	66	4	7	35	20	127	1.92	0.81
18	Bar code reader	66	1	10	32	23	121	1.83	0.74
	Weighted Mean							**2.47**	

VH=Very High; H=High; L=Low; VL=Very Low

Out of the 18 ICT listed, Photocopier($\bar{X}$ = 3.33, SD = 0.47) obtained the highest mean score, while, Barcode reader ($\bar{X}$ = 1.83, SD = 0.74) obtained the least mean score. On the whole, the weighted mean of 2.47 was obtained indicating that academic librariansin selected Federal University Libraries in North Central Nigeria were not using ICT for service delivery.

Table 2: Services delivered by ICT in selected Federal University Libraries in North Central Nigeria

S/N	Statement	N	SA 4	A 3	D 2	SD 1	F	X	SD
1	Reference service	66	18	28	9	11	185	2.80	1.03
2	Circulation service	66	4	11	27	24	127	1.92	0.88
3	Current Awareness Services (CAS)	66	2	3	26	35	104	1.58	0.72
4	Selective Dissemination of Information (SDI)	66	4	8	33	21	127	1.92	0.83
5	Serials service	66	30	35	1	0	227	3.44	0.53
6	Document delivery service	66	4	10	30	22	128	1.94	0.86
7	Referral service	66	1	17	29	19	132	2.00	0.78
	Weighted mean							**2.23**	

SA = Strongly Agree; A = Agree; D = Disagree; SD = Strongly Disagree

Out of the services listed, serials service ($\bar{X}$ = 3.44, SD = 0.53) obtained the highest mean score, while, Current Awareness Services (CAS)($\bar{X}$ = 1.58, SD = 0.72) obtained the least mean score. On the whole, the weighted mean of 2.23 was obtained indicating that academic librariansin selected Federal University Libraries in North Central Nigeria were not delivering most of the library services using ICT.

Hypothesis Testing

Ho_1: There is no significant relationship between ICT use and service delivery in selected Federal University Libraries in North Central Nigeria

Table 3: Relationship between ICT use and service delivery in selected Federal University Libraries in North Central Nigeria

Correlations

			Use of ICT	Service delivery
Kendall's tau_b	Use of ICT	Correlation Coefficient	1.000	.211*
		Sig. (2-tailed)	.	.019
		N	66	66
	Service delivery	Correlation Coefficient	.211*	1.000
		Sig. (2-tailed)	.019	.
		N	66	66

**. Correlation is significant at the 0.05 level (2-tailed).

The result in table 3 shows that the critical value (r-value) (r = 0.211) is greater than P-value (0.019) which is the level of significance. Hence, the null hypothesis was rejected. This implies that there is a positive relationship between ICT use and service delivery in selected Federal University Libraries in North Central Nigeria.

Discussion

This study investigated the use of ICT for service delivery in selected Federal University Libraries in North Central Nigeria. Two research questions and one hypothesis guided the study. Responses to research question one revealed that academic librarians in university libraries under study were not using numerous of ICT for service delivery. This is because only Computers, OPAC, Telephone / GSM, LAN, Internet, Printer, Scanner and Photocopier were used. This could be attributed to the fact that other ICT might not be available in the university libraries. This finding agree with the study of Enakrire and Ocholla (2017) which found that computers, monitors, CD ROMs, scanners, printers, search engines as well as information retrieval facilities were the most commonly used ICT facilities used in Nigeria and South African academic libraries. Corroborating this finding, Abba and Adamu (2015) revealed that majority of the respondents indicated that the ICT available were not used in delivering different services. The finding of this study disagree with Aba, Ezeani and Ugwu (2015) which reported that majority of ICT found in libraries were highly used for library services.

Furthermore, responses from research question two revealed that academic librarians in university libraries studied were not delivering most of the library services using ICT. The only services that attracted mean scores above 2.5 criterion were reference and serial services. This low usage of ICT could be attributed to epileptic power supply, low bandwidth and inadequate skills for operating the ICT among the academic librarians. This finding is in line with Mamman (2015) but contradicts ICT Butt, Qutab and Mahmood (2011). Mamman (2015) reported poor usage of ICT facilities in library operations as revealed in the mean scores of the listed items, which were far below the accepted criterion of 2.50. All the library operations had ICT used to a low extent. Omekwu and Eruvwe (2014) revealed that library services such as CAS, SDI, bibliographic searches, displays, indexing and abstracting services, circulation, interlibrary loan and referral services among others were relatively low on the application of ICT facilities in the libraries studied. Contrary to this finding, Butt, Qutab and Mahmood (2011) revealed that ICT resources were used in carrying out the functions of acquisition, reference, current awareness services and selective dissemination of information.

Finally, hypotheses tested revealed that there is a positive relationship between ICT use and service delivery in university libraries studied. This finding is not surprising because, most library services have been transformed as a result of emergence and integration of ICT into library services. Corroborating this finding, Gama (2013) indicated that ICT were used to enhance library services by five of the university libraries studied. Ezeani (2010) in a study revealed that the use of computer technologies is inevitable for effective and efficient performance of information service delivery.

Conclusion and Recommendations

This study has established that academic librarians in selected Federal University Libraries in North Central Nigeria were not using numerous ICT for service delivery. This is because only Computers, OPAC, Telephone / GSM, LAN, Internet, Printer, Scanner and Photocopier were used. Also, it has been revealed that the academic librarians were not delivering most of the library services using ICT. The only services delivered using ICT were reference and serial services. Furthermore, the study has established that there was positive relationship between ICT use and service delivery in selected Federal University Libraries in North Central Nigeria. These findings have posed serious concerns especially in this 21st century, hence, the following were recommended:

(i) There is the need for management of universities and the university libraries in North Central Nigeria to ensure adequate provision of modern ICT facilities that would enhance service delivery among academic librarians. This can be achieved by allocating more funds to the university libraries and ensure judicious use of the funds.

(ii) University library managements must ensure supply of alternative power by providing standby generators that would power the ICT for optimum usage.

(iii) University library managements should ensure adequate subscription of bandwidth and internet service that would enable academic librarians use ICT for effective and efficient service delivery

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INFLUENCE OF UTILISATION OF NEW MEDIA ON INFORMATION SERVICE DELIVERY IN UNIVERSITY LIBRARIES IN TARABA STATE, NIGERIA

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Abstract
This paper examined the influence of utilisation of new media on information service delivery in university libraries in Taraba State, Nigeria. Two research questions and one null hypothesis guided the study. The study adopted correlational survey research design and the population comprised twenty four (24) librarians and sixteen (16) library officers, totaling forty (40) library personnel delivering various information services in Federal University, Wukari, Kwararrafa University, Wukari and Taraba State University, Jalingo. Data collected were analysed using descriptive statistics to answer the two research questions, while, inferential statistics of Pearson Product Moment Correlation (PPMC) was used to test the formulated null hypothesis at 0.05 level of significance. Findings from the study revealed that new media were underutilised in the studied university libraries, because, only World Wide Web, Search engines, Instant Messaging / Email, Facebook, Whatsapp and Short Message Service (SMS) were used for information service delivery. Furthermore, the null hypothesis tested revealed that there was positive relationship between utilisation of new media and information service delivery. The study recommended provision of digital devices such as smart phones, ipads, laptops and other facilities; increase use of new media and Internet bandwidth by providing more funds to the university libraries as this would go a long way in enhancing the use of new media for information service delivery in university libraries in Taraba State, Nigeria.

Keywords: Influence; Utilisation; New Media; Information Service Delivery; University, Libraries; Taraba State; Nigeria.

Introduction

Information services are those services provided by the university libraries with the aim of serving users' efficiently and effectively. They are geared towards providing information to the users in a bid to satisfy their day-to-day information needs. These services according to Idowu (2011) include: reference, document delivery, circulation, computerised interactive search, technical, serials, exhibition and display services. Others are user education, selective dissemination of information (SDI), current awareness services (CAS), referral, reprographic, counseling and webliographic services. The adoption, application and use of ICT in university libraries have reshaped the way and manner information services are

delivered to users regardless of distance. This view is affirmed by Aina, *et. al.* (2010) who revealed that, the adoption of ICT by university libraries has led to globalisation of library services. It has changed the way and manner services are delivered. New media are regarded as the latest types of media that have been developed for communication in the contemporary world, which often rely on Internet network for utilisation. Example of new media used in libraries include Library 2.0 / Library website, World Wide Web, Search engines, RSS feeds, Podcast, Instant Messaging / Email, Facebook, Twitter, Whatsapp, Instagram, Blogs, and SMS, Mobile Apps, Internet call, Computer networks and One Drive. This paper is an attempt to examine the influence of utilisation of new media on information service delivery in university libraries in Taraba State, Nigeria.

Recent empirical studies have reported various levels utilisation of new media in libraries across the globe. AlKarousi, Jabr, AlHarrasi and Bouazza (2015) carried out a study in academic libraries in Oman aimed at adopting of new media tools. Qualitative research method was used, while interview was used in collecting data for the study. Analysis of the study indicated that two libraries under the study used facebook, two others used twitter and one other used YouTube and instagram for library services. The study further indicated that new media tools could enhance information services delivery such as current awareness services and communication about new acquisitions to library users among others. In African context, Gichora and Kwanya (2015) conducted a study in Kenya on the impact of new media tools in academic libraries. Survey research method was used in surveying nine academic libraries, and the libraries were selected through purposive sampling. The findings of the study revealed that, the major new media tools used in the libraries under study include wikis, RSS, blogs, podcast, instant messenger, YouTube, LinkedIn, and facebook among others.

Furthermore, Akeriwa, Penzhorn and Holmner (2016) conducted a study at University of Development Studies Library, Ghana. Findings from the study revealed low use of social media such as blogs, social bookmarking, instant messaging, social networking and video sharing at University of Development Studies Library, Ghana. In Nigerian, Oyovwe-Tinuoye, Krubu and Ijiekhuamhen (2017) assessed academic librarians' use of web 2.0 tools in South-South, Nigeria. Analysis of the study showed that the services rendered through these tools include reference, current awareness, marketing library services, collaborating with colleagues and friends for image and video sharing, blogging, for meeting training needs and social tagging and bookmarking. Madu, Idoko, Dirisu and Emerole (2017) conducted a study to examine the Nigerian university libraries' institutional readiness and adoption of web 2.0 tools for information service delivery. The results of the study revealed that web 2.0 tools were very useful in provision of information service as agreed by majority of the respondents. Baro, Idiodi and Godfrey (2013) surveyed awareness and use of new media tools by librarians in Nigeria. Findings from the study indicated that social networking sites, instant messaging, media sharing sites, facebook, twitter, blogs as well as wikis were the most frequently used among other web 2.0 tools due to their popularity. Singha and Sarmah (2015) disclosed that new media tools enhanced the best practices of library services in academic libraries.

Statement of the Research Problem

Advances in information and communication technology (ICT) and adoption of new media have revolutionised all library and information services ranging from reference, circulation, indexing and abstracting, current awareness, selective dissemination of information and referral services. Some of the applications include: Library 2.0 / Library website, World Wide Web, Search engines, RSS feeds, Podcast, Instant Messaging / Email, Facebook, Twitter, Whatsapp and Instagram among others. However, preliminary investigation conducted by

the researchers in the university libraries in Taraba State, Nigeria revealed that there was poor information service delivery. Moreover, majority of the users relied on information obtained from search engines, which perhaps were mostly irrelevant for quality teaching, learning and research. This could have led to producing graduates with low level of intelligence and skills. Could this also be attributed to underutilisation of new media by library personnel in the discharge of their duties of information service delivery? It is against this background that this study examined the influence of utilisation of new media on information service delivery in university libraries in Taraba State, Nigeria.

Research Questions

The study provided answers to the following research questions:-

(i) What are the information services delivered using new media in university libraries in Taraba State, Nigeria?

(ii) What is the level of utilisation of new media for information service delivery in university libraries in Taraba State, Nigeria?

Hypothesis

One null hypothesis was tested at 0.05 level of significance.

H_{01}: There is no significant relationship between utilisation of new media and information service delivery in university libraries in Taraba State, Nigeria.

Methodology

This study adopted correlational research design and the population comprised twenty four (24) librarians and sixteen (16) library officers, totaling of forty (40) library personnel in the three university libraries selected for the study in Taraba State, Nigeria. These universities include: Federal University, Wukari (23), Taraba State University, Jalingo (9) and Kwararrafa University, Wukari (8). These universities are federal, state and privately owned respectively. The entire population of 40 library personnel was used for the study. Questionnaire was used in data collection. Mean and standard deviation and PPMC were used to analyse research questions and test the null hypothesis.

Data Analysis

Response Rate

Out of the forty (40) copies of questionnaire administered on respondents, 37(93%) were filled and retrieved.

Table 1: Information services delivered using new media in university libraries in Taraba State, Nigeria

S/N	Statement	N	SA 4	A 3	D 2	SD 1	F	X	SD
1	New media are used in delivering reference service	37	17	19	1	0	127	3.43	0.55
2	New media are used in delivering circulation service	37	2	5	18	12	71	1.92	0.83
3	New media are used in document delivery service	37	1	7	16	13	70	1.89	0.81
4	New media are used in delivering Current Awareness Services (CAS)	37	10	16	5	6	104	2.81	1.02
5	New media are used in delivering Selective Dissemination of Information (SDI)	37	1	2	19	15	63	1.70	0.70
6	New media are used in delivering webliographic service	37	1	3	14	19	60	1.62	0.76
7	New media are used in providing serials	37	1	3	20	13	66	1.78	0.71

	service								
8	New media are used in providing referral service	37	1	2	18	16	62	1.68	0.71
9	New media are used in marketing and promotion	37	1	2	19	15	63	1.70	0.70
10	New media are used in communicating and interacting with users	37	15	21	1	0	125	3.38	0.55
	Weighted mean							**2.19**	

SA = Strongly Agree; A = Agree; D = Disagree; SD = Strongly Disagree

Out of the ten (10) information services listed, reference service ($\bar{X}$ = 3.43, SD = 0.55) was the most delivered service as indicated by the respondents, while, webliographic service ($\bar{X}$ = 1.62, SD = 0.76) was the least delivered. On the whole, the weighted mean of 2.19 was obtained indicating that library personnel in university libraries in Taraba State were not utilising new media for information service delivery.

Table 2: Level of utilisation of new media for information service delivery in three university libraries in Taraba State, Nigeria

S/No	New Media	N	HU	U	LU	NU	FX	$\bar{X}$	SD
			4	3	2	1			
1	Library 2.0 / Library website	37	2	7	16	12	73	1.97	0.87
2	World Wide Web	37	4	21	11	1	102	2.76	0.68
3	Search engines	37	6	21	10	0	107	2.89	0.66
4	RSS feeds	37	3	8	16	10	78	2.11	0.91
5	Podcast	37	2	4	21	10	72	1.95	0.78
6	Instant Messaging / email	37	9	15	11	2	105	2.84	0.87
7	Facebook	37	7	21	6	3	106	2.86	0.82
8	Twitter	37	4	7	17	9	80	2.16	0.93
9	Whatsapp	37	13	24	0	0	124	3.35	0.48
10	Instagram	37	2	4	22	9	73	1.97	0.76
11	Blogs	37	8	8	13	8	90	2.43	1.07
12	Mobile Apps	37	8	8	12	9	89	2.41	1.09
13	SMS	37	6	21	8	2	105	2.84	0.76
14	Internet call	37	6	3	22	6	83	2.24	0.93
15	Computer networks	37	4	7	16	10	79	2.14	0.95
16	One Drive	37	1	6	18	12	70	1.89	0.77
	Weighted Mean							**2.43**	

HU = Highly Utilised; U = Utilised; LU = Low Utilised; NU = Not Utilised

Out of the sixteen (16) new media tools listed, Whatsapp ($\bar{X}$ = 3.35, SD = 0.48) was the most used new media tools as indicated by the respondents, while One Drive ($\bar{X}$ = 1.89, SD = 0.77) was the least used. On the whole, the weighted mean of 2.43 was obtained indicating that library personnel in university libraries in Taraba State were not utilising new media for information service delivery.

Hypothesis Testing

H_{01}: There is no significant relationship between utilisation of new media and information service delivery in university libraries in Taraba State, Nigeria

Table 3: Relationship between utilisation of new media and information service delivery

Correlations

			Utilisation of new media	Information service delivery
Kendall's tau_b	Utilisation of new media	Correlation Coefficient	1.000	.255*
		Sig. (2-tailed)	.	.036
		N	37	37
	Information service delivery	Correlation Coefficient	.255*	1.000
		Sig. (2-tailed)	.036	.
		N	37	37

*. Correlation is significant at the 0.05 level (2-tailed).

The result in Table 3 showed that the critical value (r-value) (r = 0.255) is greater than P-value (0.036) hence, the null hypothesis is rejected. This implies that there was positive relationship between utilisation of new media and information service delivery in university libraries in Taraba State, Nigeria

Discussion

This study investigated utilisation of new media on information service delivery in university libraries in Taraba State, Nigeria. Two research questions and one null hypothesis were formulated and tested. Responses from research question one revealed that library personnel use new media for reference, current awareness services (CAS) and communicating and interacting with users. The study also revealed under-utilisation of new media for circulation, document delivery, Selective Dissemination of Information (SDI), webliographic, serials, referral as well as marketing and promotion services. This could be attributed to the fact that majority of the library personnel used the new media for social purposes rather than for library operations. This finding corroborated the findings of Oyovwe-Tinuoye, Krubu and Ijiekhuamhen (2017) but contradicted that of Madu, Idoko, Dirisu and Emerole (2017). Oyovwe-Tinuoye, Krubu and Ijiekhuamhen (2017) reported that the services rendered using new media tools include: reference, current awareness services, marketing library services as well as collaborating with colleagues and friends; while Madu, Idoko, Dirisu and Emerole (2017) revealed that, web 2.0 tools were very useful in the provision of information service as agreed by majority of the respondents. Also, this finding is in conformity with that of Baro, Idiodi and Godfrey (2013) who reported that social networking sites, instant messaging, media sharing sites, facebook, twitter, blogs as well as wikis were the most frequently used among other web 2.0 tools due to their popularity.

Furthermore, responses from research question two revealed that new media were underutilised, because, only World Wide Web, Search engines, Instant Messaging / Email, Facebook, Whatsapp and SMS were used for information service delivery in university libraries in Taraba State. This could be attributed to the fact these new media tools were more popular among library personnel and were used for various purposes including information service delivery, while, Library 2.0 / Library website, RSS feeds, Podcast, Twitter, Instagram, Blogs, Mobile Apps, Internet call, Computer networks and One Drive were not utilised for information service delivery. This finding agreed with that of AlKarousi, Jabr, AlHarrasi and Bouazza (2015) who indicated that, among the academic libraries studied in Oman, only two university libraries used facebook, two university libraries used twitter and one other university library used YouTube and instagram for information service delivery. The finding disagreed with that of Gichora and Kwanya (2015) who revealed that the major web 2.0 tools used in Kenyan libraries studied include wikis, RSS, blogs, podcast,

instant messenger, YouTube, LinkedIn, and facebook among others. Moreover, Akeriwa, Penzhorn and Holmner (2016) reported low use of social media such as blogs, social bookmarking, instant messaging, social networking and video sharing at University of Development Studies Library, Ghana.

The result of the null hypothesis tested revealed that there was positive relationship between utilisation of new media and information service delivery in university libraries in Taraba State, Nigeria. This implies that utilisation of new media influenced information service delivery. This is due to the fact that there was paradigm shift from the traditional mode of operations to modern systems in university libraries as a result of development and adoption of new media tools in libraries. The new media are geared toward enhancing the efficiency of services delivered to users. The finding from this study is in line with that of Singha and Sarmah (2015) who discovered that new media would enhance the best practices of library services in academic libraries in India.

Conclusion

Based on the findings of the study, it is concluded that new media were underutilised as they were used only for reference, current awareness services (CAS) and communicating and interacting with users in the three university libraries in Taraba State, Nigeria. This was a serious cause for concern as the university libraries could not be able to efficiently provide other services such as circulation, document delivery, Selective Dissemination of Information (SDI), webliographic, serials, referral as well as marketing and promotion services.

Recommendations

Based on the findings of the study, the following recommendations are made:-

(i) Management of university libraries in Taraba State should provide digital devices such as smart phones, ipads, laptops and other facilities so as to facilitate access and use of new media for information service delivery.

(ii) Library personnel in university libraries in Taraba State should endevour to use new media tools in order to deliver services that would improve the academic standard of their universities.

(iii) Universities and library management in Taraba State should increase Internet bandwidth by providing more subscription funds to the libraries as this would go a long way in enhancing the use of new media for information service delivery in the libraries.

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THE EFFECTS OF COLLABORATIVE INSTRUCTIONAL STRATEGY ON ACHIEVEMENT IN CHEMISTRY AMONG SECONDARY SCHOOL STUDENTS IN MINNA METROPOLIS: IMPLICATIONS FOR ENHANCING QUALITY EDUCATION.

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Abstract
This study sought to investigate the effects of collaborative instructional strategy on achievement in chemistry among secondary school students in minna metropolis. The research design was a quasi – experimental,Pre test – Posttest, non – equivalent and non randomized control group design. The study was conducted in two government secondary schools in minna metropolis randomly selected which involved a total of 102Senior Secondary School II students. Two instruments were used for data collection, the Test and the treatment instruments respectively. The Test instrument used was Chemistry Achievement Test (CAT) consisting of 25 – Multiple Choice Items on the concept electrolysis. The reliability coefficient of the instrument was found to be 0.85 (P<0.05).The Treatment instrument used was an instructional package called Student Teams – Achievement Division (STAD).The experimental group and control groups were given pretest in the first week of the research after which the treatment was applied and the posttest was administered in the sixth week using Chemistry Achievement Test (CAT). The data collected were analyzed using analysis of Covariance (ANCOVA), and the hypotheses put forward weretested at an alpha level of 0.05. The study revealed that students that were exposed to Student Teams – Achievement Division (STAD) instructional strategy had higher achievement score compared to those taught the concept electrolysis using lecture teaching method. It was recommended that teachers should expose students to STAD instructional strategy while delivering classroom instruction so as to enhance quality education.

Keywords: Collaborative Instructional Strategy, Achievement, Chemistry Students, Quality Education.

Introduction

Chemistry is one of the science subjects taught at the senior secondary school level, being a core subjects that students are required to pass in order to qualify for admission into tertiary institutions to pursue science-based programs such as Medicines, Engineering, Pharmacy, Agriculture, Engineering, among others (Njoku, 2017). Despite the importance of Chemistry, theWest Africa Examination Council (WAEC) chief examiners reports have shown continuous decline in chemistry achievement from 2015 – 2017.However, some findings revealed that students finds the concept electrolysis difficult to understand, which makes them bored and loose interest during class instruction (Olorundare, 2017). Some researchers attributed this poor performance in Chemistry to the use of ineffective or poor teaching strategy (Olorunyomi, 2017). Instructional strategy is crucial in the construction of Knowledge. Thus, the strategy adopted by the teacher may promote the construction of knowledge or hinder it, which may discourage initiatives and curiosity of learners. Therefore, the need for a collaborative instructional strategy becomes necessary (Ameh, 2016).

Collaborative instructional strategyis a structured student centered instructional strategy involving students working together as a group or team (Opara, 2017). The use of collaborative instructional strategy is being characterized base on 5E's which means; Engage, Explore, Explain, Elaborate and Evaluate (Eze,2016), the strategy isconstructive innature, involvelearners'activeparticipation,promoteskillacquisition and beabletogenerateinterestamongstudentsinthelearningprocess thereby making learningmeaningful (Dantani,2017). There are various types of Collaborative instructional strategies; Think-Pair-Share, Three-StepInterview, JigsawII and student teams - achievement design. However, Several research findings have shown that the use of Student Teams – Achievement Division (STAD) technique have a high tendency in improving students interest, achievement and retention in chemistry (Azare, 2015& Al - Mustapha, 2016).

Student Teams-Achievement Divisions (STAD)is a Collaborative instructional strategy which is structured by the teacher based on the lesson objective in which students work as a team to attain recognition after meeting a certain criteria (Timothy, 2016). However, in STAD, students are assigned to four-member learning teams that are mixed in performance level, gender, and ethnicity. The teacher presents a lesson, and then students work within their teams to make sure that all team members have mastered the lesson. Finally, all students take individual quizzes on the material, at which time they may not help one another.Students' quiz scores are compared to their own past averages, and points are awarded on the basis of the degree to which students meet or exceed their own earlier performance. These points are then summed to form team scores, and teams that meet certain criteria may earn certificates or other rewards. Hence, STAD provides a planned sequence of instruction that place students at the centre of learning experiences, encouraging them to explore, construct their own understanding of scientific concepts and relate those understanding to other concepts so as to attain higher achievement in Chemistry (Timothy, 2016).

Achievement refers to the level of success attained by students in school (Jimoh, 2010), which is used to evaluate the effectiveness of instructional strategy used by the teacher, Achievement is a continuous process in teaching and learning activities, it pre – inform teachers and learners on their capability or level of effectiveness within a given instance or time frame. Various research findings revealed divergent opinion on the relationship that exists between achievement and gender.

Statement of the Research problem

Despitetheimportance of Chemistry, the West Africa Examination Council (WAEC) chief examiners reportsshowed that between 2015 – 2017, the average pass rate at credit level (grade 1 - 6) in chemistry was 10.40% while the failure rate (grade 9) was 62.80%. Moreover, the result revealed a continous decline in achievement from 2015 – 2017, which makes it necessary to curtail further occurrence of poor result in chemistry. However, some findings revealed that students finds the concept electrolysis difficult to understand, which makes them bored and loose interest during class instruction (Olorundare, 2017). Researchers attributed the cause of this poor result to the use of poor or ineffective instructional strategy (Olorunyomi, 2017). Thus the need to assess other instructional strategy becomes necessary. Hence, the researcher intends to investigate the effect of collaborative instructional strategyon achievement in Chemistry among secondary school students in minna metropolis of Niger state.

Literature review

Koroka, et al (2017) investigated the impact of laboratory instructional strategy on secondary school biology students' achievement on the concept of diffusion in Minna metropolis, using a sample of 160 students from two government secondary schools. Result revealed that the use of laboratory instructional strategy enhanced students' achievement and also gender friendly.

(Shehu & Dantani, 2017) individually examined the effect of jigsaw II instructional strategy on achievement in the concept Chemical kineticsand stoichiometry among secondary school students respectively. Their findings revealed that the use of Jigsaw II instructional strategy enhance higher achievement in the concept chemical kinetics and stoichometry, respectively. However, the female students perform better than the male students.

The results conducted by Koroka, et al (2017) and Shehu (2017) revealed divergent opinion on the use of instructional strategy on achievement of male and female students respectively. Therefore, the need to investigate effect of collaborative instructional strategy on achievement in Chemistry among secondary school students in Minna metropolis becomes necessary.

Purpose of the Study

The main purpose of this study was to determine the impact of Student Teams – Achievement Division (STAD) instructional strategy on achievement in Chemistry among senior secondary school chemistry students in Niger State, with specific emphasis in Minna metropolis. The study also sought to investigate:

(i) The achievement of students taught electrolysis using STAD instructional strategy and those exposed to lecture teaching method.
(ii) The difference in chemistry achievement among students taught electrolysis using STAD instructional strategy and those exposed to lecture teaching method.
(iii) The difference in chemistry achievement of male and female students who were taught chemistry using STAD instructional strategy.

Research Question

The following research questions were raised and answered to guide this study:

(i) Is thereany effect of using STAD instructional strategy to teach the concept electrolysis to students' on achievement and those exposed to lecture teaching method?

(ii) Is there any difference in the chemistry achievement of students who were taught electrolysis using the STAD instructional strategy and those taught using lecture teaching method?

(iii) Is there any difference in the chemistry achievement of male and female students who were taught electrolysis using STAD instructional strategy?

Research Hypotheses

The following research hypotheses were stated based on the research questions raised for this study and were tested in the course of the study:

HO_1: There is no significant difference in the mean achievement scores of students taught the concept electrolysis using STAD instructional strategy and those taught with lecture method?

HO_2: There is no significance difference in the mean achievement scores of male and female students taught the concept electrolysis using STAD instructional strategy?

Methodology

The design of the study is quasi experimental study. Specifically,pretest - posttest non – equivalent and non randomized control group design. The design is considered suitable for this study due to the fact that intact class was used to avoid disruption of normal class lesson. The experimental and control groups were first pre – tested and thereafter the experimental group was taught the concept of electrolysis using the Student Teams – Achievement Division (STAD) instructional strategy while the control group was taught the same topic using lecture method. After a period of two weeks a post – test (same as pretest) was administered to both groups.

Sample and Sampling Technique

Thepopulation of this study consists of1024government senior secondary school two (SSII) Chemistry students in Minna metropolis. The choice of SSII was because it is not an examination class and teachers can co-operate with the researcher.Two secondary schools were randomly selected by simple balloting from the pool of secondary schools in Minna metropolis. Sample size for this study was 102 students using multi – stage sampling technique. A total of two intact classes of 102Chemistry students from the two schools participated in the study. Out of the two intact classes of 102 students from the two schools selected, one of the intact classes sampled was assigned to the experimental group and the other from different sampled school was assigned to the control group and was treated using lecture method respectively. Instrument used for data collection was the Chemistry Achievement Test (CAT).

Research Instrumentation

Two instruments were used for this study, the treatment and Test instruments respectively. The treatment instrument used on experimental group was STAD instructional strategy while lecture teaching method was used on control group. The test instrument used for data collection was Chemistry Achievement Test (CAT). CAT consists of 25 – Multiple Choice Items on the concept electrolysis. The CAT was developed by first constructing a test blue print for the different content specified. The objective of the topics in SSII Chemistry scheme of work served as a guide for developing the questions. The items of the instrument were developed to cover both lower and higher order

questions on the concept electrolysis, respectively. Each test item had four options (A – D) and only one of the options is correct. Each correct answer (option) carries four (4) marks giving a total score of 100%.

Validity of the Instrument
The Instruments were validated by two Chemistry and science education experts from Ahmadu Bello University Zaria, Kaduna State and Federal University of Technology, Minna, Niger State, respectively.

Reliability of the Test Instrument
Day Secondary School Maitumbi Minna, was used for establishing the reliability of the test instrument (Pilot test) using test – retest method at an interval of two weeks. The scores of the two sets were correlated using Pearson's Product Moment Correlation Coefficient formula (PPMC) and r = 0.85 was obtained. This indicated that the instrument is reliable and also suitable for the purpose of this study.

Method of Data Collection
The Schools selected were visited by the researcher for permission from the school authorities. Thereafter, the researchers were introduced to both the Chemistry teachers and SSII Chemistry students. After orientation and administration of pre – test, the researchers taught both the experimental and control groups the concept of electrolysis in Chemistry. Experimental group was taught using STAD instructional strategy while lecture teaching method was used on control group. Treatment using CAT was followed after one week of revision, after which post – test was administered to both groups. The research period lasted for six (6) weeks.

Data Analysis
The data collected were analyzed using frequency and percentage to present the demographic data of the participants. Mean and standard deviation were used to answer research one while the other research questions were hypothesized and tested with the use of Analysis of Covariance (ANCOVA) at 0.05 level of significance.

Results
Table 1:Demographic information of the groups

Groups	**Gender**	**Frequency (%)** **Sub – Total (%)**
STAD (Experimental)	Male 20 (19.6%)	39 (38.2%)
	Female 19 (18.6%)	
Lecture (Control)	Male 19 (18.6%)	63(61.8%)
	Female 44(43.2%)	
Total	102 (100%)	102 (100%)

A closer look at Table:1 above showed that out of 102 (100%) students that were sampled forthe study, 39 (38.2%) of the participants were in the experimental group (STAD learning strategy) out of which 20(19.6%) were male and19 (18.6%) were female. However, 63(39%) of the participants constituted the control group out of which 19 (18.6%) were male and 44(27.5%) were female.

Answering the Research Questions.

Research Question One: *Is there any effect of using STAD instructional strategy to teach the concept electrolysis to students' on achievement and those exposed to lecture teaching method?*

Table 2: Pre - test and Post – test Mean and standard deviation achievement scores of students taught with STAD instructional strategy and those exposed to Lecture teaching methods.

Method	N	Pre – test		Post – test		Mean Gain
		Mean	Std. Dev	Mean	Std. Dev	
STAD	39	8.38	2.04	16.66	4.25	8.28
Lecture	63	6.96	1.90	12.14	3.45	5.18

As shown in Table:2 above, the achievement of students (both the experimental and control groups) in the post – test was higher than their achievement in the pre – test. This implies that the achievement of students (both the experimental and control groups) before the treatment was low, however after the treatment, the achievement of students taught the concept electrolysis using the STAD strategy was 16.66 while the achievement of students taught the concept electrolysis using the lecture methods was 12.14. This implies that the use of STAD learning strategy in teaching and learning of the concept electrolysis improved chemistry achievement of students with a mean gain of 8.28 contrary to lecture method with 5.18 respectively.

Hypotheses Testing

Hypothesis One: There is no significant difference in the mean achievement scores of students taught the concept electrolysis using STAD instructional strategy and those taught with lecture method?

Table 3: Analysis of Covariance (ANCOVA) showing the difference in the achievement of students taught the concept electrolysis using STAD and those exposed to lecture methods respectively

Source	Type III sum of Squares	df	Mean Square	F	Sig.
Corrected model	636.902[a]	2	318.451	24.583	0.000
Intercept	590.140	1	590.140	45.557	0.000
Pre – test	143.940	1	143.940	11.112	0.001
Treatment	287.925	1	287.925	22.227	0.000
Error	1282.441	99	12.954		
Total	21549.000	102			
Corrected Total	1919.343	101			

a. R squared = .332 (Adjusted R Squared = .318)

Table 3 showed that the F – value of 22.23 was obtained with a p – value of 0.00computed at 0.05 alpha level. Since p- value (0.00) is less than alpha level (0.05), the null hypothesis one was rejected and thus, there was a statistically significant differences in the achievement of students taught the concept electrolysis using STAD instructional strategy and those taught using lecture method ($F_{(1.99)} = 22.23$, $p < 0.05$).

Table : 4 Pair wise Comparisons Analysis showing the effect of the Treatment on Students' achievement in Chemistry

Treatment	Mean	Mean Difference	Std. Error	Sig[b]
STAD	16.66[a]	4.52*	0.77	0.00
Lecture	12.14[a]	-4.52*	0.77	0.00
Grand Mean = 14.40				

***the mean difference is significant at 0.05 level**

To determine the direction of the significance, Multiple comparison Analysis was depicted in Table 4 to show where the difference lies (i,e the effect of the treatment on students achievement). Table 4 revealed that students taught electrolysis using STAD instructional strategy had higher mean score of 16.66 than those taught using lecture method having a mean score of 12.14. This implies that students taught the concept electrolysis using STAD instructional strategy perform better than those taught using lecture method.

Hypothesis Two:
There is no significance difference in the mean achievement scores of male and female students taught the concept electrolysis using STAD instructional strategy?

Table 5: Analysis of Covariance (ANCOVA) showing the difference in the achievement of male and female students taught the concept electrolysis using STAD instructional strategy.

Source	Type III sum of squares	df	Mean Square	F	Sig.
Corrected model	132.664[a]	2	66.332	4.310	0.021
Intercept	213.962	1	213.962	13.904	0.001
Pre – test	76.787	1	76.787	4.990	0.032
Gender	14.042	1	14.042	0.912	0.346
Error	554.003	36	15.389		
Total	11520.000	39			
Corrected Total	686.667	38			

a. R Squared = .193 (Adjusted R Squared = .148)

Table 5 showed that the F – value of 1.97 was obtained with a p – value of 0.16 computed at 0.05 alpha level. Since p – value (0.16) was greater than alpha level (0.05), the null hypothesis two was retained and thus, there was no statistically significant difference in achievement of male and female students taught the concept electrolysis using STAD instructional strategy ($F_{(1.93)} = 1.97$, $p < 0.05$).

Discussion of Findings
Findings from this study revealed that the achievement of students (both the experimental and control groups) before the treatment was low, however after the treatment, achievement of students taught electrolysis using the STAD strategy was higher than those exposed to lecture method. This may be due to the fact that STAD strategy exposed students beyond the traditional and regular method thereby resulting in students' higher achievement.

This study also revealed that there was a statistically significant difference in achievement of students taught the concept electrolysis using the STAD instructional strategy and those taught using lecture methods. Students taught the concept electrolysis using the STAD instructional strategy performs better than those taught using lecture method.This outcome corroborates with the findings of (Shehu & Dantani, 2017) which revealed that the use of jigsaw instructional strategy enhances achievement when compared to the lecture method.

In addition, the results obtained from this study revealed that the achievement of male and female students taught the concept electrolysis using the STAD instructional strategy do not differ as no statistically discrepancy was found in the achievement of male and female students that were taught using STAD instructional strategy. This outcomesupports the findings of Koroka, et al, 2017 which revealed no statistically significant difference on male and female students exposed to laboratory instructional strategy but had divergent opinion with the study of (Shehu & Dantani, 2017) which revealed female students performing better than the male students.

Conclusion

The STAD instructional strategy enhances better achievement of students. It could also be concluded that the use of STAD instructional strategy did not reveal any significant difference in the results towards gender as both male and female students that were exposed to the STAD instructional strategy performs well in the concept electrolysis.

Recommendations

With respect to the findings of this study, the following recommendations are proffered:

(i) Teachers should expose students to STAD instructional strategy while delivering classroom instruction so as to enhance better understanding there by making learning meaningful.

(ii) Teachers should take into consideration both male and female students while teaching using the STAD instructional strategy since it is gender friendly.

(iii) School authorities and educational administrators should see that the STAD instructional strategy is integrated into secondary school curriculum in science subjects

Implications for Quality Education

The following are some of the implications of the use of STAD instructional strategy:

(i) Research findings attributing the cause of poor performance in Chemistry to use of ineffective or poor instructional can be curtailed when STAD instructional strategy is explored in all secondary schools in Niger state and the nation at large thereby improving chemistry achievement among students.

(ii) The study on the effect of STAD instructional strategy on chemistry achievement revealed that the STAD instructional strategy is gender friendly, improves team spirit, leadership quality and active participation among students. This makes learning meaningful and interesting thereby explores students' motivation to learning.

(iii) The use of STAD instructional strategy improves teachers' and students' learning style thereby bridging the existing gap between teachers – students relationship to effective instructional delivery.

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INFLUENCE OF CONTINUOUS ASSESSMENT METHODS ON POSTGRADUATE STUDENTS' ACHIEVEMENT IN RESEARCH METHOD IN NASARAWA STATE UNIVERSITY, KEFFI, NIGERIA

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Abstract
Continuous assessment is a part and parcel of the teaching and learning process. Information generated by this assessment has formative, diagnostic as well as summative functions .This assumes that the items used in the assessment tasks possess the necessary qualities that render the tasks valid and reliable. This paper investigated the influence of continuous assessment methods on postgraduate students' academic achievement in research method in Faculty of Education Nasarawa State University, Keffi, Nigeria. Five research questions related to five null hypotheses guided the study. Descriptive survey research design and Ex-post facto research design were used. 534 postgraduate students were used as population of the study while 260 were sampled for the study through stratifies random sampling technique. Questionnaire on continuous assessment methods of postgraduate students' academic achievement (QCAMPSAA) and proforma were used as instruments for data collection and validated by experts. Validity and reliability indices of 0.79 and 0.88 were obtained. Data collected was analyzed using descriptive statistics of mean and standard deviation to answer the research questions whiles inferential statistics of Chi-square (χ^2) was used to test formulated hypotheses at 0.05 level of significant. The findings of this study revealed that CA influence postgraduate students' academic achievement in research method. The study recommends that, the lecturers should use CA methods effectively and should also consider affective and psychomotor domains in areas needed in order to improve postgraduate students' academic achievement in research method.

Key words: Seminar, test, examination, assignment, project and achievement.

1.0 Background to the Study

Educational system consists of educational planning which is concerned with activities leading to the achievement of goals and objectives such as the establishment of ends and means relationship, ranking of alternative strategies, allocating personnel, material space and other resources, analyzing performance constructing time, cost schedules and the regular revision of objectives (Adeyemi and Arogundade, 2005). Therefore, it is the responsibility of the teacher or instructor to know and study the environment properly to know the best educational system appropriate for the type of assessment that is suitable to the learners. Continuous Assessment in schools embraces the cognitive, the affective and the psychomotor domains.

The importance of improving the quality of education system is to supply the country with highly competitive human resources .It is only through the use of assessment strategies that one can establish the extent to which educational goals have been attained. Assessment is

defined as the process of investigating the status or standard of a learner's achievement/attainment or the achievement of a group of learners, where group instruction prevail, with reference to expected outcomes which must have been specified as objectives Anikweze (2013). Assessment it is the practical application of measurement and just as all testing could be subsumed under assessment, so could all assessment be subsumed under measurement. It involves collecting data with a view to making value judgment about the quality of a person, object, group or event. Bliss (2000) continuous assessment is a method of evaluating the progress and achievement of learners in educational institutions with the aim of getting the true possible picture of each learner's ability and helping each to develop his/her abilities to the fullest.

Okonkwo (2002) defined continuous assessment as a method of evaluation in which learners' achievement in the cognitive, affective and psychomotor domains from the moment they become learners until the end of it, are determined using scores obtained from various instruments and techniques such as test, projects, rating scale, checklist, observation, interviews and other possible techniques. Hence, it is a mechanism whereby the final grading of the learners in the cognitive, affective and psychomotor domains of learning systematically takes account of all their performance during a given period of schooling. Adam (2000) considered continuous assessment in its present form as a cumulative appraisal which coordinates the performance of the individuals from the three domains of learning, namely; the cognitive, the affective and the psychomotor domains. However divergent these definitions might be, they all stress the need for an assessment procedure which takes into consideration the pupils' performance throughout the period of schooling in order to render the overall ability of the learner more valid.
Continuous assessment methods are classroom strategy implemented by teachers to ascertain the knowledge, understanding, and skills attained by pupils. Teachers administer assessments in a variety of ways over time to allow them to observe multiple tasks and to collect information about what pupils know, understand, and can do. These assessments are curriculum-based tasks previously taught in class. Continuous assessment occurs frequently during the school year and is part of regular teacher-students interactions. Students receive feedback from teachers based on their achievement that allows them to focus on topics they have not yet mastered. Teachers learn which students need review and remediation and which students are ready to move on to more complex work. Thus, the results of the assessments help to ensure that all students make learning progress throughout the school cycle thereby increasing their academic achievement.

Assessment is also a powerful diagnostic tool that enables pupils to understand the areas in which they are having difficulty and to concentrate their efforts in those areas. Continuous assessment also allows teachers to monitor the impact of their lessons on pupil understanding. Teachers can modify their pedagogical strategies to include the construction of remediation activities for pupils who are not working at the expected grade level and the creation of enrichment activities for pupils who are working at or above the expected grade level. Hence, the continuous assessment process supports a cycle of self-evaluation and pupil-specific activities by both pupils and teachers. Frequent interaction between pupils and teachers means that teachers know the strengths and weaknesses of their learners. These exchanges foster a student's-teacher relationship based on individual interactions. Students learn that the teacher values their achievements and that their assessment outcomes have an impact on the instruction that they receive. One-to-one communication between the teacher and the pupil can motivate students to continue attending school and to work hard to achieve higher levels of mastery. In continuous assessment, teachers assess the curriculum as implemented in the classroom. It also allows teachers to evaluate the effectiveness of their teaching strategies relative to the curriculum, and to change those

strategies as dictated by the needs of their pupils. In addition, continuous assessments provide information on achievement of particular levels of skills, understanding, and knowledge rather than achievement of certain marks or scores. Thus, continuous assessment enables pupils to monitor their achievement of grade level goals and to visualize their progress towards those goals before it is too late to achieve them.

The issues of grading and reporting on student learning have perplexed educators for the better part of the century Guskey (2011). In recent years, assessment of student learning has become a topic of great emphasis in the educational literature. Many previously unfamiliar terms, such as practical assessment, authentic assessment, alternative assessment, portfolios, and journaling have become a part of the established vocabulary in educational publications. The implication of the newly emerged emphasis on alternative methods of assessment also has a significant effect on what is taught and how it is taught.

According to Rakow (1992), curriculum as used in the schools is driven by assessment. Mitchell (1992) addressed the distinction between assessment and testing. Assessment is an activity that can take many forms, can extend over time, and aims to capture the quality of a student's work. A test is a single- occasion, one-dimensional, timed exercise, usually in a multiple-choice or short-answer form. The influence of testing on student achievement has been a subject of research for many years. Recently, the possible negative effects of traditional testing have caused the development of new alternative methods of assessment, and traditional assessment has been pushed aside. However, traditional tests do have advantages over other forms of assessment. They are less time consuming than most other forms of assessment, even when they include higher level thinking items. It is also relatively easy to validate and determine internal consistency for traditional multiple choice tests. Past studies, including Gaynor *and* Millham (1976), found that students who took weekly quizzes earned higher scores on final examinations than did those who took only midterm exams. Other studies indicate that higher scores by students who are frequently tested may be attributed to the students' test wiseness and teachers who "teach to the test"

Classroom Test: The simple dictionary meaning of test is a trial of something to find out its value, or quality, or composition. For instance, in Nigeria, the National Food and Drug Administration Commission (NAFDAC) carries out tests to determine the quality of newly manufactured drugs and other imported consumables in Nigeria. Such tests are carried out in laboratory using precision equipment and tools. In the teaching-learning process involving human behaviours, testing implies a trial of somebody to find out his/her ability, powers, knowledge, skills, achievement and attitudes, and so on. The instrument used in carrying out the trial is called the test. The Encarta Dictionary (2009) equates tests to examination consisting of a series of questions, problems, or practical tasks to gauge somebody's knowledge, ability, or experience. A test is also a trial run-through of a process or on equipment to find out if it works. Such tests serve as basis for evaluating or judging something or somebody in terms of presence of certain qualities, attributes or capabilities. Drever (1976) in the Penguin Dictionary of Psychology articulated what could be considered a more elaborate and technical definition of test as:

(i) a standardized type of examination given to a group of individuals; it may be qualitative or quantitative, i.e. determine the presence or absence of a particular capacity, knowledge or skill, or determine the degree in which such is present; in the later case, the degree may be determined by the relative position of an individual in the group or the population, or by assigning a definite numerical value in terms of some selected unit.

This comprehensive definition suggests that the purpose of a classroom test is to identify or discover what a person can do under certain controlled circumstances. For instance, from testing, a teacher will be able to find out whether a learner has the capability to answer a number of questions either orally or written, or perform a task or tasks within some limited time. Thus, teachers use tests to establish the achievement gaps in learners. The achievement gap refers to the different levels of academic performance of learners from different geographical, ethnic and socio-economic backgrounds.

A test**,** in the formal schooling system, is used to designate any kind of device for measuring ability, achievement, interest and other traits. It could be a set of questions, tasks or problems intended to measure an individual's knowledge, skill, aptitude, intelligence, etc. A test should be considered as a measuring instrument (Harbor, 1999). Testing therefore, is a systematic procedure of presenting a set of questions, tasks or problems to testees and expecting them to respond to the items either orally or written, and sometimes by performance within specified time schedule. Testing really is the act of giving written or oral assignments, quizzes, projects or tasks to a group of test takers or candidates. Generally, the process of testing involves a tester and testee(s), or an examiner and examinee(s) and is aimed at establishing the occurrence of any change in the behaviour of the testee(s) or examinee(s) (Ugodulunwa and Ugwuanyi, 1999). Test also refers to the result obtained from testing. It must be noted that testing is just one aspect of measurement. Examination is an assessment intended to measure knowledge of students on they have learned in the classroom. Examination may be administered on paper, on a computer in order to determine the academic achievement of students. Seminar presentation: A presentation in which one gives their analysis of a topic, and then responds to questions and leads a discussion of the presentation. Presenters demonstrate:

(i) Having thought critically about the topic.
(ii) Clarity of thought and focus.
(iii) Inquiry and discussion
(iv) Ability to respond respectfully and intellectually to others.

Project: Project method: Castle (2001) explained project method as a co-operative study of a real life situation by a class or even by a whole school, under the guidance of the teachers. According to him, project aims at:

(i) Bring students into real contact with the activities of the school neighborhood.
(ii) Present students with real life problems, which they solve by thinking and working together.
(iii) Develop further skills and new knowledge in the school subjects while tackling the project.

Assignment: Take home assignment is the task or duty that is assigned to students. Teachers use this strategy to assess the performance of students in the classroom. Generally, assessment is the process of investigating the status or standard of a learner's achievement/attainment or the achievement of a group of learners, where group instruction prevails, with reference to expected outcomes which must have been specified as objectives. Assessment is the practical application of measurement and just as all testing could be subsumed under assessment, so could all assessment be subsumed under measurement. When a person is assessing something, the person is engaged in the determination of the worth and value of that thing. Obioma (1988) defined assessment as the process of using the results obtained from measurement to take relevant decisions about a programme being assessed. Wikipedia, the free encyclopedia (2009) defines educational assessment as the process of documenting, usually in measurable terms, knowledge, skills, attitudes and beliefs. Assessment can focus on the individual learner, the

learning community (class, workshop, or other organized group of learners), the institution, or the educational system as a whole. Assessment in education occurs whenever one person, in some kind of interaction, direct or indirect with another, is conscious of obtaining and interpreting information about the knowledge and understanding, or abilities and attitudes of that other person (Rowntree, 1987).

McMillan (2000) lamented that there persists a relatively little emphasis on assessment in the preparation and professional development of teachers. In light of current demands for comprehensive evaluation amidst contemporary theories of learning and motivation, teacher educators should insist on proper understanding and application of different aspects of assessment and evaluation. Assessment is often divided into formative and summative categories for the purpose of considering different objectives for assessment practices. Formative assessment - Formative assessment is generally carried out throughout a course or project. Formative assessment also referred to as 'continuous assessment' or 'educative assessment' is used for obtaining continuous feedback to both the teacher and the learners for the purpose of determining the progress of learning during a course of instruction and for improving learners' performance through remediation. Summative assessment - Summative assessment is generally carried out at the end of a course or project for decision making as it affects promotion of pupils, selection of pupils, grouping of pupils, curriculum planning and evaluation, certification of pupils, hiring or firing of teachers, maintenance of school standards and comparing pupils and schools.

1.2 Objectives of the Study

The main purpose of this research was to investigate the influence of continuous assessment methods on postgraduate students' academic achievement in research method in Faculty of Education, Nasarawa State University, Keffi, Nigeria**.** Specifically this study sought to:

(i) Examine how seminar presentations influence students' academic achievement in research method.
(ii) Find out how research project influence students academic achievement in research method.
(iii) Determine how classroom test influence students academic achievement in research method.
(iv) Determine how classroom assignment influences students' academic achievement in research method.
(v) Examine how classroom examination influences students' academic achievement in research method.

1.3 Research Questions

The study sought answers to the following five research questions:

(i) How does seminar presentation influence students' academic achievement in research method?
(ii) To what extent does research project influence students' academic achievement in research method?
(iii) How does classroom test influence students' academic achievement in research method?
(iv) How does classroom assignment influence students academic achievement in research method?
(v) How does classroom examination influence students' academic achievement in research method?

1.4 Research Hypotheses

The following five null hypotheses were tested at 0.05 level of significant:

(i) There is no significant difference between seminar presentation and students academic achievement in research method.

(ii) There is no significant difference between research project and students academic achievement in research method

(iii) There is no significant difference between classroom test and students academic achievement in research method.

(iv) There is no significant difference between classroom assignment and students academic achievement in research method.

(v) There is no significant difference between classroom examination and students academic achievement in research method.

2.0 **Theoretical Frame work**

This paper anchored on Constructivist Theory by Vygostky, 1978:

2.1 Constructivist Theory (Vygostky, 1978)

Constructivism is a theory of knowledge that argues that humans generate knowledge and meaning from an interaction between their experiences and their ideas. During infancy, it is an interaction between their experiences and their reflexes or behaviour-patterns. Constructivists claim that teachers cannot transfer intact knowledge from their heads to the learners and that knowledge is constructed by the learner. According to Vygostky effective learning occurs, only when learners develops and accommodates meaning in a context that builds on their prior knowledge. According to the constructivist theory, accommodation is the process of reframing one's mental representation of the external world to fit new experiences. Through the processes of accommodation and assimilation, individuals construct new knowledge from their experiences. When individuals assimilate, they incorporate the new experience into an already existing framework without changing that framework. This may occur when individuals' experiences are aligned with their internal representations of the world, but may also occur as a failure to change a faulty understanding; for example, they may not notice events, may misunderstand input from others, or may decide that an event is a fluke and is therefore unimportant as information about the world. In contrast, when individuals' experiences contradict their internal representations, they may change their perceptions of the experiences to fit their internal representations.

It is important to note that constructivism is not a particular pedagogy. In fact, constructivism is a theory describing how learning happens, regardless of whether learners are using their experiences to understand a lecture or following the instructions for gaining the understanding. However, constructivism is often associated with pedagogic approaches that promote active learning, or learning by doing. The above theory is relevant as an anchorage theory to this study. The constructivist holds that learners make meaning of what is taught in the classroom when they are given the opportunity to participate actively in the learning process. While the behaviorism focuses on the external behavior of the learner cognitive, on the other hand emphasizes on the internal mental structures of the same thus lending itself to abstract information processing rather than actual behaviors. Cognitive theorists acknowledge the importance of reinforcement; however they underscore its role in providing feedback about the correctness of responses over its role as a motivator.

2.12 Empirical Studies

Muhammed (2013) investigated the effects of Continuous Assessment on academic achievement of NCE chemistry students in Kaduna state. The population of the study comprises of all chemistry students in colleges of education in Kaduna state. The sample consisted of 90 chemistry students drawn from the colleges of Education in Kaduna state. Apre-test post-test experimental control group design was used. The experimental group was further divided into two groups,E1and E2, while only one group serves as control group. The experimental group EI was subjected to two sets of Continuous Assessment while E2, the second experimental group was subjected to four sets of Continuous Assessment and finally the control group C was left without any Continuous Assessment. Pre-test and post-test were administered to the three groups. Five hypotheses were stated. Two instruments, teacher made test (T.M.T) was used for the Continuous Assessment and Organic Chemistry Test (OCT) was used as both pretest and post test. The data obtained were analyzed using F-test, ANOVA, t-test, and Pearson product moment correlation coefficient (r) statistics at 0.05 level of significance. The findings of the study revealed that:--Continuous Assessment has significant effect on academic achievement of NCE students.-There is no significant difference in the achievement of male and female students when exposed to fewer C.A's.-There is significant difference in the achievement of male and female students when exposed to many C.A's.-There is no significant correlation between C.A scores and final examination scores of NCE chemistry students. In the light of the findings from this study, it was recommended that chemistry teachers should strive to see that at least four C.A's are given to students per semester in order to improve their academic achievement and that teachers should also be properly trained on the methods and techniques of Continuous Assessment construction and administration for the system to be effective.

Driver (1976) examine the role of continuous classroom assessment in shape of tests and assignments in academic achievement of students at elementary level in English language. A total of 60 students were randomly assigned as either the experimental or the control group and were pre-and post-tested to determine their academic achievements before and after the treatment. The experimental group was continuously assessed through tests and assignments, while control group did not receive any such type of treatment. Results were analyzed using mean, standard deviation and t-test. From the findings it was observed that the use of continuous classroom assessment in shape of tests and assignments enhanced achievement in English language. The significant difference favoring those continuously assessed with the help of tests and assignments as assessment tools. While it is demonstrated that continuous classroom assessment has an important role in student s achievement. The results of this study could help elementary education institutions to enrich the assessment process of students through weekly tests and daily assignments. It is recommended that Small group activities especially in this part of the world with large class size can be easily assessed. In schools and even with examination bodies, younger students who are not highly verbal and who are better suited to action tests should always be assessed through written tests

Bethel and Hillary (2010) investigated the views of geography teachers and students on the value of continuous assessment strategies in students' learning of geography in senior high schools in the Cape Coast Metropolis and Cape Coast North District within the Central Region of Ghana. Data were collected with the use of two sets of questionnaires from 20 geography teachers and a random sample of 198 geography students. Descriptive statistics were used to analyze the data. The study revealed that although there are various kinds of continuous assessment strategies, geography teachers most often used take-home assignment, written test and recap exercise to assess how geography students learn geography. It was found that the use of continuous assessment helps students to

understand difficult areas as well as master the content of geography. Continuous assessment also makes students more confident and ready for final examinations. Therefore, it was recommended that geography teachers need more assistance in devising the rubrics for using the various kinds of continuous assessment strategies.

Castle (2001) examines effect of continuous assessment techniques on students' performance at EL98own speed. The difference between the means of the high achievers and low achievers of both the groups on retention test is greater than the difference between means on post-test. It indicates that both the high and the low achievers of the experimental group better understand the concept of social studies than the control group. This is the evidence that continuous assessment focuses on students understanding rather than memorization. The teacher of experimental group was of the view that continuous assessment help teachers to get better understanding of learning needs of the students. In this way they gain a deeper understanding of teaching and learning strategies. The findings of present study are same those of James and Folorunso (2012) who conducted a study in Nigeria and found a significant effect of treatment on students' achievement in mathematics.

3.0 Methodology

This paper adopted descriptive survey research design to investigate the influence of continuous assessment methods on postgraduate students' academic achievement. The population comprised 534 respondents with 260 sampled using stratified random sampling technique from the four departments in Faculty of Education, Nasarawa State University, Keffi, Nigeria. Questionnaire on continuous assessment method and postgraduate students' academic achievement in research method (QCAMPSAAM**)** with proforma were used as instruments for data collection and validated by experts to eliciting responses about the methods of CA in Nasarawa state University. The instruments contained 5 CA methods for lecturers on CA and were structured on a 5-point Likert type scale. The instruments were validated by two experts and the index of 0.79 was obtained. Cronbach alpha method was employed to determine the reliability of the instruments which yielded a reliability coefficient of 0.88 index. Descriptive statistics of means and standard deviations were used to answer research questions while inferential statistics of Chi-square was used to test the formulated hypotheses at 0.05 level of significant.

4 .0 Analysis of Rusts

Hypothesis 1: There is no significant difference between seminar presentation and students academic achievement in research method.

Table 1: χ^2 of significant difference between seminar presentation and students academic achievement in research method

Variables Used	N	Mean	SD	Df	Level of Significant	χ^2_{cal}	χ^2_{tab}	Decision Rule
Seminar	160	11.7	2.5					H_0
				258	0.05	1.64	1.98	Accepted
Achievement	100	10.8	2.11					

Table 1 shows the χ^2-calculated is 1.64 while the χ^2tabulated is 1.98 at two-tail 0.05 level of significance and df 258. Since the χ^2calculated is less than the χ^2tabulated, the null hypothesis is rejected. This implies that there is no significant difference between mean of seminar presentation and students academic achievement in research method. In other words, lecturers should apply CA in all domains to improve students' achievement.

Hypothesis 2: There is no significant difference between research project and students academic achievement in research method.

Table 2: χ^2 of significant difference between research project and students academic achievement in research method

Variable Used	N	Mean	SD	df	Level of Significant	χ^{2cal}	χtab^2	Decision Rule
Project	64	4.1	10.1	258	0.05	1.49	1.98	H_0 Rejected
Achievement	196	3.2	6.2					

From the table 2 show that the χ^2calculated 1.49 while the χ^2 tabulated is 1.98 at 0.05 level of significance with the df of 258. Since the χ^2calculated is less than the χ^2-tabulated, the null hypothesis is rejected. This implies that there was significant difference between research project and postgraduate students academic achievement in research method.

Hypotheses 3: There is no significant difference between classroom test and students academic achievement in research method.

Table 3: χ^2 Analysis of significant difference between classroom test and students academic achievement in research method

Variables Used	N	Mean	SD	df	Level of Significant	χ^2_{cal}	χ^2_{tab}	Decision Rule
Classroom Test	61	9.2	3.12	258	0.05	1.72	1.98	H_0;Rejected
Achievement	199	14.3	7.2					

Table 3 shows the t-calculated is 1.72 while the t-tabulated is 1.98 at 0.05 level of significance and df 258. Since the χ^2-calculated is less than the χ^2 tab, the null hypothesis is not accepted. This implies that there was significant difference between seminar presentation and postgraduate students academic achievement in research method. By implications, CA should apply in order to improve students' achievement in research method.

Hypothesis 4; There is no significant difference between classroom assignment and students academic achievement in research method.

Table 4: χ^2 results on significant difference between classroom assignment and students academic achievement in research method.

Variables Used	N	Mean	SD	df	Level of Significant	χ^2_{cal}	χ^{2tab}	Decision Rule
Assignment	62	18.5	3.13	258	0.05	1.69	1.98	H_0Rejected
Achievement	198	12.21	7.2					

Table 4 shows the χ^2_{cal} is 1.69 while the χ^2tabulated is 1.98 at 0.05 level of significance and df 258. Since the χ^2calculated is less than the χ^2_{tab}, the null hypothesis is not accepted. This implies that there was significant difference between classroom assignment and students academic achievement in research method.

Hypothesis 5: There is no significant difference between classroom examination and students academic achievement in research method.

Table 5: χ^2 results significant difference between classroom examination and students academic achievement in research method.

Variables Used	N	Mean	SD	df	Level of Significance	χ^2_{cal}	χ^2_{tab}	Decision Rule
Examination	197	9.5	4.12	258	0.05	1.41	1.98	H_0Rejected
Achievement	63	13.2	5.4					

Table 5 shows the t-calculated is 1.41 while the χ^2_{tab} is 1.98 at 0.05 level of significance and df 258. Since the χ^2_{cal} is less than the χ^2 tabulated, the null hypothesis is rejected. This implies that there was significant difference between classroom examination and students academic achievement in research method.

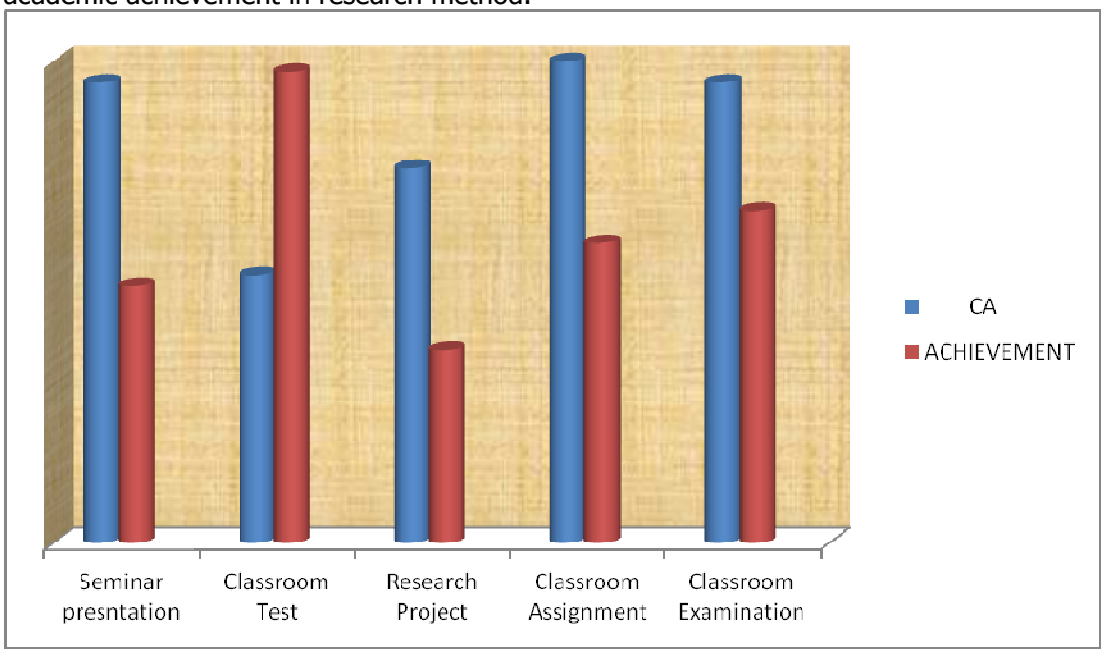

Figure 1; Bar chart on methods of CA on Postgraduate Students Academic Achievement in research method.

4.1 Discussion of Findings

There was significant difference between seminar presentation and students academic achievement in research method agreed with Muhammed (2013) who revealed that Continuous Assessment has significant effect on academic achievement of NCE students.- There is no significant difference in the achievement of male and female students when exposed to fewer C.A's.-There is significant difference in the achievement of male and female students when exposed to many C.A. There is no significant correlation between C.A's scores and final examination scores of NCE chemistry students. In the light of the findings from this study, it was recommended that chemistry teachers should strive to see that at least four C.A's are given to students per semester in order to improve their academic achievement and that teachers should also be properly trained on the methods and techniques of Continuous Assessment construction and administration for the system to be effective.

There was significant difference between project and students academic achievement in research method this finding agreed with Driver (1976) who found that the use of continuous classroom assessment in shape of tests and assignments enhanced achievement in English language. The significant difference favoring those continuously assessed with the help of tests and assignments as assessment tools. While it is demonstrated that continuous

classroom assessment has an important role in students' achievement. The results of this study could help elementary education institutions to enrich the assessment process of students through weekly tests and daily assignments. It is recommended that Small group activities especially in this part of the world with large class size can be easily assessed. In schools and even with examination bodies, younger students who are not highly verbal and who are better suited to action tests should always be assessed through written tests.

There was significant difference between classroom test and students academic achievement in research method. This finding go in line with Bethel and Hillary (2010) who found that although there are various kinds of continuous assessment strategies, most teachers often used take-home assignment, written test and recap exercise to assess how students learn geography. It was found that the use of continuous assessment helps students to understand difficult areas as well as master the content of geography. Continuous assessment also makes students more confident and ready for final examinations. Therefore, it was recommended that geography teachers need more assistance in devising the rubrics for using the various kinds of continuous assessment strategies.

There was significant difference between classroom assignment and examination on students' academic achievement in research method. This finding agreed with Castle (2001) his finding shows that, there was difference between the means of the high achievers and low achievers of both the groups on retention test is greater than the difference between means on post-test. It indicates that both the high and the low achievers of the experimental group better understand the concept of social studies than the control group. This is the evidence that continuous assessment focuses on students understanding rather than memorization. The teacher of experimental group was of the view that continuous assessment help teachers to get better understanding of learning needs of the students. In this way they gain a deeper understanding of teaching and learning strategies. The findings of present study are same those of James and Folorunso (2012) who conducted a study in Nigeria and found a significant effect of treatment on students' achievement in mathematics.

5.1 Conclusion

Continuous assessment is a periodic and systematic method of assessing and evaluating a student attributes. C A of students' progress is also a mechanism whereby the final grading of students in the cognitive; affective and psychomotor domains of learning systematically takes account of all their achievements during a given period of schooling. All CA methods in this study influence students' academic achievement.

5.2 Recommendations

Based on the findings of this study, the following were recommended:

(i) The research method lecturers should considered classroom test, examination, seminar presentation and project as major methods of continuous assessment.
(ii) Research method lecturers should be train on how to put these methods of CA in to practice effective students' achievement.
(iii) Lecturers who are well versed in evaluation and assessment methods should be encouraged.

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IMPACT OF DIGITAL STORYTELLING ON READING FLUENCY AND COMPREHENSION OF PUPILS WITH SPECIAL NEEDS IN SOKOTO STATE, NIGERIA

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Abstract
The study explores the Impact of Digital Storytelling Strategies on Reading Fluency and Comprehension of Pupils with Special Needs in Sokoto State, Nigeria. The problem of the study was the predominant use of conventional instructional method in teaching reading skills to primary school pupils in the study area irrespective of the pupils' learning condition. The study has a sample size of 94 pupils. Static Group Pre-test and Post-test research design was employed for the study. Two research questions, and two null-hypotheses were formulated. The hypotheses were statistically tested at α=0.05 level of significance. t-test independent sample was employed to test the null-hypotheses. Ten reading passages were selected and converted into multi-modal forms of Digital Storytelling as treatment.The study finds no significant difference in the levels of reading fluency between gender of the pupils exposed to digital storytelling strategy. Also, no significant difference was also noted in the level of reading comprehension between boys and girls exposed to digital storytelling in the study area. Consequently, the study concludes that, Digital Storytelling strategy has the potential to enhance reading fluency and comprehension of the participants across genders. In this view, DSTS is recommended to stakeholders in early grade reading programme intervention in the public primary schools, to cater for pupils with Special Needs in the study area.

Keywords: Digital Storytelling Strategies, Reading Fluency, Reading Comprehension and Pupils with Special Needs

Introduction

With the advent of 21st century, and with the rapidity with which technology has changed the educational setting, the concept of literacy has also changed to include the ability to manipulate digital and multimedia gadgets for educational purposes necessary to remain relevant in the society. This necessity informs the need to integrate information communication technology into the classrooms for educational purposes to align with the modern concept of literacy, and to prepare the pupils with adequate skills to thrive in this global digital environment (Chung, 2007; Suleiman, 2011; Garba and Olaofe, 2013). These, among many other reasons, justify the need to explore the Impacts of Digital Storytelling Strategies on, Reading Fluency and Comprehension of Pupils with Special Needs in Sokoto. The following keywords need, at this juncture, to be defined: Digital storytelling, reading fluency, reading comprehension, and pupils with special needs.

The concept of Digital Storytelling was pioneered by Lambert and Ashley based on the assumption that every child has a story to tell (Suleiman, 2011; Chung, 2007). The strategy is a form of Multimedia Literacy that measures the ability of users to perform tasks on digital images, audio and video clips. Green, (2013); Robin & McNeil (2016) and Suwardy, Pan & Seow (2013) report that there are two broad-techniques in which digital storytelling strategy could be integrated in the classroom. One of the techniques known as leaners generated content, involves learners to create their own digital story as means of learning certain

curriculum specific subjects. The second technique known as content-based digital storytelling are created by teachers for teaching and learning purposes.

National Reading Panel, 2000; Rasinski, 2004; Applegate, Applegate and Modla, 2009; and Jibrilla, 2014 define reading fluency as an indicator of speed, accuracy and prosody of oral reading, adding that, fluency build a bridge to reading comprehension based on its three fundamental dimensions: accuracy in word decoding, automatic processing and prosodic reading. However, a new interest on reading fluency instruction emerged. The new trend assesses reading fluency with comprehension based on the argument that "Comprehension is the basis for any reading instruction (NEI, 2011; Moats, 2004).

Reading comprehension refers to the process of constructing meaning from the information provided by the author either informs of traditional or digital discourse type. Reading comprehension is the essence of reading and ultimate goal of any form of reading instruction (Beatrice, 2008; Vaughn & Candace, 2009; and Snowling, Cain & Oakhill, 2009). And for learners to obtain effective comprehension skills, they must possess a variety of skills including automaticity in word decoding (McConnaughhay, 2008).

National Policy of Education (2013) defines Pupils with Special Needs to include any pupil that fall within any of the following classifications: Pupils with visual and hearing impairments; Pupils physically challenged or with any particular health impairment; Pupils with mild, severe or profound intellectual disabilities; Pupils identified with behavioural or learning disabilities disorders; Pupils exhibiting speech and language disorders; and The gifted, talented and the albinos. However, in this study, Pupils with Special Needs are defined as Pupils with Reading Difficulties. These are pupils who were reduced to unintelligent learners due to inappropriate materials and instructional approaches. The challenges of these teaming populations of individuals stem from insufficient instruction, low socio-economic status and poor learning environment (Freeman & Freeman, 2004; Olaofe, 2001; Milne, 2005; Raponi, 2016). In addition, considerable number of these types of learners are mostly found in the rural public primary schools where reading is not encouraged.

Statement of the Problems

The problem of this study is the over-dominance of traditional method in the study area, regardless of the learning-condition of the pupils. It is a fact that, Digital technology in the 21st century, just like English language, has come to stay and already have acquired an important position in the overall economic and social development of the nation (Nigeria) in particular and the world in general. Consequently, learners of the 21st century require complex and multiple literacies; for inevitably the proliferation of technology and the capacity to easily record, store and send moving images, sounds and text would continue to change the way we communicate and challenge the way we create meaning from different forms of communication (O'Rourke, 2005).

Aim and Objectives of the Study

The aim of this study was to explore the impacts of Digital Storytelling on Reading Fluency and Comprehension rates of the participants. However, the specific objectives include to:

(i) examine the Impacts of Digital Storytelling Strategies on Reading Fluency of Pupils with special needs between genders in Sokoto State; and to

(ii) analyze the Impacts of Digital Storytelling Strategies on Reading Comprehension of Pupils with special needs between genders in Sokoto State.

Research Questions

The following research questions were asked to achieve the objectives of the study:

(i) Is there any significant difference in the level of ORF between boys and girls with special needs as the result of exposure to Digital Storytelling Strategies in Sokoto State?

(ii) Is there any significant difference in the reading comprehension level between boys and girls with special needs as the result of exposure to Digital Storytelling Strategies in Sokoto State?

Null Hypotheses

The following null hypotheses were formulated from the research questions as guide to the study and tested at $\alpha \leq 0.05$ significance level.

(i) There is no significant difference in the level of reading fluency between boys and girls with special needs as the result of exposure to Digital Storytelling Strategy in Sokoto State.

(ii) There is no significant difference in the reading comprehension level between boys and girls with special needs as the result of exposure to Digital Storytelling Strategy in Sokoto State.

Significance of the Study

The present research could be of great benefit to pupils with special needs their parents, members of the community, and international stake holders concerned with early grade reading assessment, as well as teachers training institutions. The study offers reading fluency and comprehension programme as an empowerment tool for pupils with Special needs. The aim of the study being to empower the Pupils with special needs (PSN) to read fluently with a desirable speed and accuracy as a step towards developing their reading comprehension via digital storytelling Strategy. With this intervention, it is believed the pupils would acquire necessary training to bridge the achievement gap between their peers. by this means this intervention may serve as a license for the pupils to continue with their education for living a meaningful life in the society.

Method and Materials

The study employed Matching Only Static Group Pre-and Post-test Design. The design is chosen for the study because it allows the use of existing classroom structure, where random sampling could not be possible. In this research design, the pre-test and post-test scores of the participants are compared to determine the gains of the study (Fraenkel & Wallen, 2000; Sambo, 2005; McQueen & Knussen, 2006).Whole Class Reading Comprehension Screening Tests was administered to the for matching the pupils into group. For the sake of this study, those pupils scoring unsatisfactory comprehension score of between 0-39 were considered as pupils with special needs, thereby, being suitable candidates for the study.

Population

All primary five pupils reading with difficulty in the public primary schools in Sokoto State constitute the target population for this study. According to Departments of Research Planning and Statistics, and Department of Quality Assurance of the Sokoto State Universal Basic Education Board, the State has a total population of 25, 056 class five primary school pupils. 14,660 of the pupils are males, while the remaining 10,056 are female pupils (SUBEB, 2015). However, the population of pupils with special needs is unknown. Consequently, sampling by proportion technique was employed to estimate the population of the target population from the schools sampled out for pilot study. The outcome of the pilot study conducted reveals that, over 90% of the total number of primary five pupils in

the study area constitute Pupils with special needs. Therefore, the study estimates the population of Pupils with special needs at 23,000.

Sample Size and Sampling Techniques

Irrespective of the population size, the study has a sample size of 94 pupils, 47 from each of the two school based on the recommendation by Fraenkel & Wallen (2000) that a minimum group of 30 participants is ideal for experimental research. While, purposive sampling technique was employed to sample the school. This was based on the understanding that the schools were homogenously using the same curriculum content; employing the same conventional approach; the teacher were employed by the same board; and having the same minimum teaching qualification. The schools were also not undergoing any International educational intervention programme of any sort.

Instrumentation

Two instruments were used in this study. Whole Class Reading Comprehension Screening Test (WHOCREST)and Individual Reading Fluency and Comprehension Test (IRFACT). WHOCREST is a screening test that was used to screen out able and disable readers based on their reading comprehension ability for this study. Pupils scoring below 50 marks are considered as pupils with special needs, thereby, considered as suitable participants of this study.

IRFACT has two sub-tests: Oral reading fluency and reading comprehension test. In this study only rate and accuracy of the pupils reading were assessed(Vaughn & Candace, 2009: 294). Reading rate is frequently measured by the number of words read correctly aloud per minute in specified grade level passage. While accuracy of word reading is determined by dividing the number of words read correctly by the number of errors committed. There are three levels of reading accuracy in assessing oral reading fluency. These include: Independent level; Instructional level; and Frustration levels (Klaude & Guthrie, 2008).The Reading Comprehension part of the IRFACT measures individual pupil's ability to answer ten questions from a passage. The questions were both direct and simple. Pupils were expected to answer the comprehension questions after reading the passage once. Although the questions were not timed, excessive time taken to answer the question was considered as predicator of poor comprehension(Fry 1977; Quinn et al, 2007).

Result

Research Question One

Is there any significant difference in the level of ORF between boys and girls with special needs as the result of exposure to Digital Storytelling Strategies in Sokoto State? To answer this question, the mean scores of the post-test assessment between gender, excluding those exempted from the tasks was compared and presented in Table One.

Table 1 Means of Levels of Reading Fluency between Genders

Gender	Mean	SD	Mean Difference	N	Excluded	Total
Boys	43.82	40.196	6.728	45	3	48
Girls	37.09	38.152		32	14	46
Total				**77**	**17**	**94**

Table One reveals that, after the treatment, boys (n = 45) had a mean score of 43.82, while the girls (n=32) had a mean score of 37.09. The table shows a means difference of 6.7 in favour of the boys. This answers the research question that, there was significant difference in the mean scores of pupils with special needs between gender as the result of exposure to digital storytelling strategy in the study area.

Research Question Two

Is there any significant difference in the reading comprehension level between boys and girls with special needs as the result of exposure to Digital Storytelling Strategies in Sokoto State? To answer this question, Table 2 presents the means scores of the two assessments by genders, excluding those stopped from the two exercises.

Table 2 Means of Reading Comprehension Levels between Gender

Gender	Mean	Mean Difference	SD	N	Excluded	Total
Boys	21.11	**1.42**	26.648	45	3	48
Girls	19.69		23.069	32	14	46
Total				**77**	**17**	**94**

Table Two illustrates that, after the treatment, boys (n=45) have a mean score of 21.11 with three of them being stopped from the test. Girls (n=32) have a mean score of 19.69 with 14 girls being stopped from the test. The mean difference between boys and girls is 1.42 in favours of the boys. This answers the research question that, there was difference in the reading comprehension level between boys and girls with special needs as the result of exposure to Digital Storytelling Strategies in Sokoto State.

Null-Hypothesis One

There is no significant difference in the level of reading fluency between boys and girls with special needs as the result of exposure to Digital Storytelling Strategies in Sokoto State. The summary of the Independent Samples T-test is presented in Table Three.

Table 3 Independent Samples t-Test on Reading Fluency between Gender

Test	Gender	N	Mean	Mean Difference	SD	T	df	P
Post-Test Level of Reading	Boys	45	43.82	**6.728**	40.196	.739	75	.462.
Accuracy	Girls	32	37.09		38.152			
Total		**77**						

t (77) = .739, P = .462

The result in Table Three shows that the t-value was obtained at .739, with p-value of .462 at 75 degrees of freedom. The p-value obtained was greater than the alpha value of 0.05. this indicates that there is no significant difference in the level of reading fluency between boys and girls with special needs exposed to Digital Storytelling Strategy in Sokoto State. Therefore, the null-hypothesis was retained.

Null-Hypothesis Two

There is no significant difference in the reading comprehension level between boys and girls with special needs as the result of exposure to Digital Storytelling Strategies in Sokoto State. Table 4 presents the summary of the Independent Samples t-Test.

Table 4 Independent t-Test on Level of Reading Comprehension by Gender

Test	Gender	N	Mean	Mean Difference	SD	t	Df	sig
Post-Test Level of Reading	boys	45	21.11	**1.424**	26.648	.244	75	.808.
Comprehension	girls	32	19.69		23.069			
Total		**77**						

t (77) =.244, P =.808

The summary of the Independent Samples t-test in Table 4 shows that the t-value was calculated at 0.244, with the p-value at .808. This implies that there was no significant difference in the reading comprehension level between boys and girls with special needs as the result of exposure to DSTS in Sokoto State. Thus,the Null-hypothesis was retained.

Discussion

The first finding reports no significant difference between the level of reading fluency between boys and girls with special needs exposed to Digital Storytelling Strategies in Sokoto State. This reveals that DSTS is gender friendly suitable for reading instruction to pupils with special needs. The finding confirms the assertion that pupils with special needs learn better when instructed via the multimedia elements (Mercer & Mercer, 1993; IDA, 2017).

The second finding reports no significant difference in the reading comprehension level between boys and girls with special needs exposed to digital storytelling in Sokoto State. This corroborates with Salkhord, Gorjian & Pazhakh (2013) who reported that, digital stories affect the learners' reading comprehension positively among Iranian pupils through an internet-based instruction. Similarly, O'Donnell (2015) reported that digital technology in reading related instructions offers viable resources to aid the reading skills of pupils with special needs.

Conclusion

Based on the findings of this study conclude that: Multimedia elements of digital storytelling have the capacity to enhance the reading fluency of boys and girls exposed to the strategy in the study area. Also, the study has shed new light that digital storytelling was amiable to both gender with reading difficulties in the study area.

Recommendations

Based on the findings of the study the following recommendation was made that digital storytelling should be embedded in the public primary schools to cater for the teaming population of Pupils with Special Needs in the study area. Also, primary school administrators should encourage their teachers to pursue digital and visual literacy skills to integrate DSTS into their classrooms.

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INFLUENCE OF WORKLOAD ON MATHEMATICS TEACHERS' MOTIVATION AND SENIOR SECONDARY SCHOOL STUDENTS' MATHEMATICS PERFORMANCE IN MINNA METROPOLIS. NIGER STATE.

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Abstract
The study examined the Influence of Workload on Mathematics Teachers' Motivation and Senior Secondary School Students' Performance in Minna metropolis. The study used expo-facto research design. The population of the study comprises of 7043 (3277 males and 3723 females) senior secondary two (SS 3) students who sat for the Niger Sate MOCK examination of 2016/2017 academic session and all 43 senior secondary school Mathematics teachers from 23 public secondary schools in Minna metropolis. A multi stage sampling techniques was used. A sample of 596 (321 males and 232 females) students in their intact class and 43 Mathematics teachers was used. One instrument titled "Mathematics Teachers' Workload Questionnaire (MTWLOQ)" with reliability coefficient of 0.75 was used for the study. Mean, standard deviation were used to answer the research question while Independent t-test was used to test the hypothesis. The study revealed that, there was a significant difference in the performance of students in schools where mathematics teachers have normal workload and in schools where Mathematics teachers have excess workload. Similarly, the study revealed that workload has significant influence on the motivation of Mathematics teachers in teaching. In the light of this, it was recommended among others that Mathematics teachers should be assigned realistic workload to keep them motivated to give their best in teaching.

Keywords: Workload, Motivation, Students' performance, Mathematics, Metropolis.

Introduction

Due to the importance of Mathematics to man to in his environment and in the field of science, the teaching of the subject is made compulsory from primary to tertiary level in Nigeria. This is reflected in the National Policy on Education (FRN, 2013) where it states it states that, "teaching Mathematics is compulsory at both primary and secondary schools levels.

Even though Mathematics was made a core subject in the school curricular, students' performance continue to worsen as the years go by (Segun, 2011). This has elicited a lot of concern among researchers and other stake holders in education to establish the cause of these failures. Some researchers have attributed these drawback to the uses of talk and chalk method (Deji, 2010) while other researchers thinks, it is the excess workload of mathematics teachers (Ando 2015, and Idde, 2013). Workload of teachers encompasses a lot of activities such as administrative and non-administrative functions perform by the teachers, teaching large class size, teaching more than one subjects and the number of periods handled by the teacher per week.

The impact of workload on teachers' motivation and students' performance cannot be overemphasized. Work has taken precedence over teachers' personal lives and health, while some teachers are willing to make such sacrifices, majority are striving to attain a healthier balance between the realms of work and life (Raines, 2011). Currently, Mathematics

teachers are working longer hours to meet the demands of the expanding job roles in today's classroom.

The recommended number of periods per subject according to the guidelines on minimum standards as contained in the National Policy on Education (FRN 2004) in (Isoken & Adeyemi, 2014) is a minimum of 18 periods and a maximum of 24 periods per week per teacher. In schools where teachers are teaching below the minimum period will be regarded as normal workload, while in schools where teachers are teaching above the minimum period will be regarded as excess work load.

The amount of work allocated to Mathematics teachers determines his motivation and students' performance (Nagwann, 2016). Work motivation can be defined as the degree of an individual's willingness to exert and maintain an effort towards attaining organizational goals (Akanbi, 2011). It reflects the interactions between workers and their work environments. Excess Mathematics teachers' workload can be associated with poor performance; on the other hand, normal Mathematics teacher's workload might leads to better performance which transcend to functional secondary education programme.

Statement of the problem

Several attempts have been made by other researchers to remedy the situation of under performance of students in both internal and external examination. Some of which has focused on providing adequate instructional material for mathematics class room (Eze, 2013), encouraging peer tutoring (Miller, 2015). Despite all these efforts, poor performance of students in Mathematics continue to persist. It is therefore pertinent to investigate if workload of Mathematics teachers may also contribute to lack of motivation of Mathematics teachers which has led to under performance of students.

Objective of the study

The study aimed to achieve the following objectives

(i) To determine if any difference exist in students' mean performance in schools where Mathematics teachers have excess workload and in schools where Mathematics teachers have normal workload.

(ii) To determine if workload could influence Mathematics teachers' Motivation in teaching.

Research questions

(i) To what extent is the difference in mean performance of students' in schools where Mathematics teachers have excess workload and in schools where Mathematics teachers have normal workload?

(ii) To what extent does workload influence Mathematics teachers' Motivation in teaching?

Research hypothesis

There is no significant difference in mean performance of students' taught by Mathematics teachers with excess and normal workload.

Methodology

The study used Expo-facto research design. The population of the study comprises of 7043 (3277 males and 3723 females) senior secondary two (SS 3) students who sat for the Niger Sate MOCK examination of 2016/2017 academic session and all 43 senior secondary school Mathematics teachers from 23 public secondary schools in Minna metropolis. A multi stage sampling techniques was used. A sample of 596 (321 males and 232 females) students and

43 Mathematics teachers was used. In addition to the students' MOCK result of 2016/ 2017 academic session, One instrument titled "Mathematics Teachers' Workload Questionnaire (MTWLOQ)" with reliability coefficient of 0.75 was used for the study. Mean, standard deviation were used to answer the research questions while Independent t-test was used to test the hypothesis.

Results

Research question one: To what extent is the difference in mean performance of students' in schools where Mathematics teachers have excess workload and in schools where Mathematics teachers have normal workload?

Table 1: Mean, Standard Deviation of Students taught by Mathematics Teachers with normal and excess workload.

VARIABLE	N	MEAN (X)	S.D
Normal workload	261	62.65	8.74
Excess workload	292	51.71	7.10

Table 1: above shows the mean and standard deviation of students in school where Mathematics teachers have normal and excess workload. The table has a mean value of 62.65 in school where Mathematics teachers has normal workload and a mean value of 51.71 in school where Mathematics teachers have excess workload. The results indicate that students perform better in school where Mathematics teachers have normal workload than in school where Mathematics teachers have excess workload.

Research question two: To what extent does workload influence Mathematics teachers' Motivation in teaching?

Table 2: Influence of Workload on Mathematics teachers' Motivation in teaching.

S/N	ITEMS	Mean (X)	S.D	DECISION
1.	I am motivated teaching more than 18 periods per week.	1.79	.96	DISAGREE
2.	Combining teaching with head of department functions affects my motivation.	2.79	1.03	AGREE
				AGREE
3.	I am satisfied with teaching and keeping school's record.	2.12	.76	AGREE
4.	Supervision and teaching does not discourage me.	2.28	.88	AGREE
5.	I am motivated to teach smaller mathematics class size to large class.	3.37	.98	AGREE
6.	Combining teaching with Liberian functions in the school motivates me	1.98	.911	DISAGREE
7.	I am usually discouraged with students' learning difficulties.	2.53	.96	AGREE
8.	I am motivated teaching Mathematics with other subjects.	1.81	.76	DISAGREE
9.	Am not discourage by large mathematics class size	1.86	.99	DISAGREE
10.	Marking load does not affect my commitment to teaching	2.42	.98	AGREE
11.	Combining teaching with house master's/mistress' function motivates me.	1.79	.71	DISAGREE
12.	I am satisfied with combining teaching with counseling functions in the school.	1.88	.73	DISAGREE
13.	Combining teaching with examination officer's functions	2.65	.97	AGREE

	discourage me.			
14.	I am satisfied combining teaching with labour master'/mistress' functions in the school.	1.74	.85	DISAGREE
	GRAND MEAN (X)	**2.21**		AGREE

Decision Mean (X) = 2

Table 4.5 reveals the mean and standard deviation values of questionnaire items 1-14 on influence of workload on Mathematics teachers' motivation in Minna metropolis. The grand mean score was found to be 2.21. using 2.0 as the average benchmark, it can be inferred that workload influence mathematics teachers' motivation in teaching.

Hypothesis testing

There is no significant difference in mean performance of students' taught by Mathematics teachers with excess and normal workload.

Table 3: Summary of the t-test Analysis of students' taught by Mathematics teachers with normal and excess workload.

Variable	N	Mean ($\bar{X}$)	S.D	DF	t	P	DECISION
Normal workload	261	62.65	8.74				
				551	.145*	.0074	Reject
Excess workload	292	51.71	7.10				

* Significant at P = 0.0074

The result from table 3 shows t-value = 0.145, df = 551, p = 0074. Thus, the hypothesis was rejected. This means that, there exists significant difference between the mean score of students' taught by Mathematics teachers with excess and students taught by Mathematics teachers with normal workload.

Discussion

From the findings, it was revealed from this study that there was significant difference between the performance of students in schools where Mathematics teachers have normal workload and excess workload. Performance of students was better in schools where Mathematics teachers have normal workload. The difference in students' performance is as result of the fact that Mathematics teachers with excess workload do not usually have enough time to teach the students well enough. Mathematics as a subject needs time and requires total dedication on the part of the teacher. Where any of the above is lacking, expected result will be far from realization. This findings is in agreement with that of (Ando, 2015 & Idde, 2013). They attributed poor performance of students at the basic level to excess workload of Mathematics teacher which hinders them from given proper attention to their students. The findings also support that of Adetunji (2012) who examine Mathematics teacher's workload as a correlates of students' performance in Mathematics and quality assurance in Upper Basic Education.

Furthermore, it was revealed from this study, that workload influence Mathematics teachers' motivation to teaching. The finding also agrees with work of Scott (2009) in Ando (2015) who is of the view that, the excessive amount of time devoted to administrative and non-curricular tasks makes teaching a stressful experience. Consequently, the relationship between the teachers and the learners becomes tense. This undoubtedly affects teachers'

motivation in teaching. Nagwann (2016) also support this view that, the amount of work allocated to Mathematics teachers determines his motivation and students' performance.

Conclusion

Students' performance is influenced by the extent of workload allocated to the Mathematics teacher. The result from the findings revealed that students' performance was better in schools where Mathematics teachers are allocated normal workload. To ensure high productivity therefore, students' performance has to be check in line with the workload of Mathematics teachers. Furthermore, it was observed that workload play a major role in the motivation of Mathematics teachers. Therefore, to ensure Mathematics teachers give their best, they have to be motivated by assigning realistic workload.

Recommendations

Based on the findings of the study, the following recommendations were made:

(i) Principals should review work processes and load distribution regularly to see if it can help lighten Mathematics' burden.
(ii) Mathematics teachers' workload should be such that it allows for adequate content coverage thus minimizes teaching towards passing the examination alone.
(iii) Policies and strategies should be developed to manage teachers' workload for better service delivery and motivation.
(iv) School management should device a method of obtaining feedback from their workers regarding the work conditions so as to be able to redesign roles to enhance job performance effectively.
(v) Teaching periods of mathematics teachers should be moderate to avoid over stretched lessons and under-utilized class duration.
(vi) Government should ensure that learning activities are monitored in schools and provide schools with adequate human and material resources when the needs arise. This will help to keep teachers motivated to always give their best.

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COMPARATIVE ANALYSIS OF GENDER PERFORMANCE OF MATHEMATICS STUDENTS ENROLLED FOR SENIOR SECONDARY CERTIFICATE EXAMINATION BETWEEN 2013-2018 IN ABUJA METROPOLIS.

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Abstract
This study comparatively analyzed the gender performance of Mathematics students enrolled for Senior Secondary Certificate Examination from 2013-2018 in Abuja Metropolis during MDGs and SDGs period. The study used ex-post-facto research design and employed a secondary data using existing records review. The SSCE Mathematics examination results for 5,453students comprised 2,639 male and 2,814 female students who sat for SSCE mock examinations from 2013-2018 were collected from Education Resource Centre (ERC) and the schools selected for the study from Abuja Municipal Area Council (AMAC) in Abuja Metropolis. The research questions were answered using descriptive statistics such as percentage and frequency counts and the null hypotheses was tested using Chi-square. The results revealed among others, progressive and stable increased in the enrolment rate for male and female students during the MDGs and SDGs periods and the performance of male and female students in MDGs period were better than the performance in SDGs period. It is therefore, recommended among others that the present programme that sustained the increased in the current enrolment rate of both gender should be sustained and extents to other states in Nigeria.

Keywords: Gender, Gender enrolment, performance, MDGs and SDGs.

Introduction

In the contemporary Nigeria, greater emphasis is being placed on industrial and technological development. As a result, students are being encouraged to take up science related subjects and a subject that cut across all the sciences is Mathematics (Adedeji, 2012). Today, Mathematics is required literally in every field of human endeavour and plays a fundamental role in economic development of any country. Different researchers in the field of education have acknowledged the place of Mathematics in scientific and technological developments (Musa & Dauda, 2014). They further stressed that the catalytic effect of education on national development emanates mainly from the area of Science and Mathematics.

In the realization of the significant role of Mathematics to the nation building, the government of Federal Republic of Nigeria made the subject compulsory at basic and secondary school levels of education in Nigeria. This provision has been made because Mathematics is said to be mother of all sciences (Buari, 2014). It was also aimed at ensuring the inculcation of Mathematics literacy and to equip students with logical and abstract thinking needed for living, problem solving and education furtherance (Badru, 2015). The choice of this topic, comparative analysis of gender performance of Mathematics students enrolled for Senior Secondary Certificate Examination from 2013-

2018 in Abuja Metropolis was informed based on the current world trend and research emphasis on gender issues and the current United Nations new developmental programme after the expiration of MDGs declaration in 2015; Sustainable Development Goals also known as Global Goals which was built on MDGs goals and adopted on 25th September, 2015 by the UN member states.

Global end-point report of Millennium Development Goals (MDG_S, 2015) reported that the primary schools enrolment rate in the developing world has reached 91 percent in 2015, up from 83 per cent in 2000 and the number of out-of-school children in primary schools age worldwide has fallen by almost half to an estimated figure of 57 million in 2015, down from 100 million in 2000, and it also reported that the gap between women and men has narrowed. National Bureau of Statistics (NBS, 2015), on MDGs performance tracking survey reported using Gender Parity Index (GPI) as an indicator to monitor target, in primary schools, the GPI in 2012 was 1.00 percent which increased in 2014 to 1.02 percent. In secondary schools, the GPI ratio was 1.02 percent in 2012 and decreased by barely to 1 percent in 2014 to 1.01 percent. This indicates that for every male, there is a female being enrolled into schools, that with this Nigeria has achieved the MDGs target.

Unfortunately, the issue of gender on students' academic performance in science subjects and Mathematics has become the global debate. Gender refers to the social meanings associated with being a male and a female, including the construction of identities, expectations, behavours and power relationships that drive from social interaction (Olutola & Dosunmu, 2015).

Similar reports on poor performance in Mathematics was observed to be at all levels starting from primary school level to the tertiary level involving both male and female students (Bashir, 2017). Similarly despite the remarkable success recorded by MDGs, available records from WAEC and NECO on the general performance of students showed a poor performance among Secondary School Students. Now we are more than two years down after the expiration of the MDGs declaration and more than two years into the UN new developmental programme; Sustainable Development Goals (SDGs) in place, then what is the trend in gender performance of Mathematics students enrolled for SSCE examination between MDGs and SDGs periods in Abuja Metropolis.

Statement of the Problem

The persistent underperformance of students in Mathematic and students' low enrolment rate in some part in Nigeria has call for concern among researchers and stakeholders in education to establish the causes of such failures and low enrolment rate.

Several attempts and policies have been made by educational stakeholders and researchers to find the ways to curb such abysmal performance, some of which focused on identifying the appropriate causes of students poor performance in Mathematics (Al-Zoubi & Mohammad, 2015) similarly Federal Government of Nigeria on her own, make Mathematics subject compulsory at basic and secondary school levels to improve the consciousness of students on the subject (Ekwueme etal., 2015), there are others global programmes like MDGs and SDGs which gear towards improving students enrolment rate and performance in school. According to Clark (2015), Sustainable Development Goals (global goals) and a broader sustainability agenda, go much further than MDGs , in addressing the root causes of poverty and universal needs for development that work for all people. Therefore, the role of Mathematics to the needed

achievement of sustainable MDGs and SDGs and universal goals cannot be overemphasized. Though there was a report of tremendous achievement made by MDGs as it was reported particularly in the area of enrolment rate. Despite all these efforts, the performance of students in Mathematics is still below expectation (Anaduaka & Okafor, 2013). The problem is that, it was not clear whether these achievements recorded in increased in gender enrolment rate in the last 3year of MDGs is still sustained in the first three years of SDGs in Abuja metropolis, and whether these achievements particularly in increased in enrolment rate is replicated in the Mathematics students' performance in SSCE examination.

Therefore, this research work is designed to comparatively analyze gender performance of Mathematics students enrolled for SSCE Mathematics Examination in Abuja metropolis.

Aim and Objectives of the Study

The study seeks to achieve the following research objectives

(i) To determine the enrolment rate of male and female Mathematics students between the last three years of MDGs (2013-2015) and the first three years of SDGs (2018-2018)

(ii) To determine the difference in the performance of male and female Mathematics students in last three years of MDGs.

(iii) To determine the difference in the performance of male and Mathematics students in the first three years of SDGs.

Research Questions

(i) What is the enrolment rate for male and female Mathematics students between MDGs and SDGs years?

(ii) What is the difference in the performance of male and female Mathematics students during MDGs years?

(iii) What is the difference in the performance of male and female Mathematics students during SDGs period?

Null Hypotheses

The following null hypotheses were formulated and tested at 0.05 alpha levels.

(i) **$HO_{1:}$** There is no significant is the difference in the performance of male and female Mathematics students during MDGs period.

(ii) **HO2**: There is no significant difference in the performance of male and female Mathematics students during MDGs period.

Methodology

The study used ex-post-facto research design. The population of the study consists of all the Senior Secondary School students who sat SSCE mock Examination in Abuja Municipal Area Council (AMAC). The sample size for this study comprised of 5,453 students, with 2,639 male and 2,814 female students selected from six Government Senior Secondary School in Abuja metropolis. A multi-stage sampling technique was employed in selecting the sample. A stratified sampling technique was used to stratify the schools for the study along the following districts: Wuse district, Asokoro district and Nyanya district. Secondly a simple random sampling technique was used to select two schools from each of the district using hat-and-draw method. The instrument for data collection was existing record review, of SSCE mock Mathematics examination results, collected from Educational Resource Centre (ERC) and the respective schools

selected. Data collected were analyzed using percentage, frequency counts and Chi-square.

Research Question One:
What is the enrolment rate for male and female Mathematics students between MDGs and SDGs period?

Table 1: Summary Analysis of difference in Enrolment rate of Male and Female Students between MDGs and SDGs Period.

Gender	MDGs	(%)	SDGs	(%)
Male	1219	48.1	1420	48.6
Female	1314	51.9	1500	51.4
Total	2533	100	2920	100

The result from table1 above showed the enrolment rate for male and female students between MDGs and SDGs period with the male students having the enrolment rate of 1219 (48.1%) and 1420 (48.6%) during MDGs and SDGs period and female students had the enrolment rate of 1314 (51.9%) and 1500 (51.4%) respectively in the same periods, with the overall enrolment rate between MDGs and SDGs for both gender stood at 2,533 and 2,920 respectively.

Research Question two:
What is the difference in the mean performance of male and female Mathematics students in MDGs period?

Table 2: Summary Analysis of difference in the Performance of Male and Female Students that Obtained Credit Pass and above during MDGs Period.

Gender	f	(%)
Male	500	51.5
Female	470	48.5
Total	970	100

The result in table2 above showed the performance of male and female students in SSCE Mathematics examination in Abuja metropolis with male students having a better performance of 51.5% over female students with 48.5% respectively.

Research Question Three:
What is the difference in the performance of male and female Mathematics students in SDGs years?

Table 3: Summary Analysis of difference in the Performance of Male and Female Students that Obtained Credit Pass and above during SDGs Period

Gender	f	(%)
Male	433	56.7
Female	331	43.3
Total	764	100

The result from the table 4, showed the performance of male and female students in SSCE Mathematics examination during the first three years of SDGs with male students performance stood at 56.7% better than female students with performance of 43.3% over the period. Results from Table1 and table2 clearly showed a decline in students'

performance during SDGs period, overall students' performance during MDGs stood at 970 while students' performance during SDGs stood at 763 respectively.

Hypothesis One: There is no significant is the difference in the performance of male and female Mathematics students during MDGs period.

Table4: Summary Analysis Chi-Square Test for Significant Difference between Male and Female Students performance during MDG Period.

Gender	Frequency	Credit Pass	df	Chi-Square	P-Value	Remark
Male	**1005**	**500 505**	**1**	**0.237**	**0.636**	**Not significant**
Female	**966**	**470 496**				

No significant at P>0.05

Table1 above provides result of Chi square statistics of the relationship between gender and students' performance in Mathematics within three years of MDG programme. About 500 male and 470 female students passed mathematics at credit level, whereas 505 males and 496 females obtained pass grade respectively. Thus, $X^2(1) = 0.237$, $p = .636$, which is greater than 0.05. Hence the null hypothesis is retained, no significant difference was found in the performance based on gender. Therefore gender is dependent on performance in Mathematics during MDGs.

Hypothesis Two: There is no significant difference in the performance of male and female Mathematics students in MDGs period.

Table5: Chi-Square Test for Significant Difference between Male and Female Students Performance during SDGs Period.

Gender	Frequency	Credit Pass	df	Chi-Square	P-Value	Decision
Male	**971**	**500 538**	**1**	**3.900**	**0.048**	**Significant**
Female	**828**	**331 497**				

Significant at P<0.05

Table 4.13, above provides results of Chi-square statistics of the relationship between gender and students performance in Mathematics within three years of SDG programme. From the results, 433 male students passed mathematics at credit level as well as 331 females. Also 538 males and 497 females secured pass grades. $X^2(1) = 3.900$, $p = .048$, which is less than 0.05.Hence the null hypothesis is rejected, as there was significant difference between the performance of male and female students in mathematics during SDG periods, with male students performing better.

Discussions of results

The above results showed a progressive increased in the general enrolment rate for both male and female students throughout the last three years of MDGs and the first three years of SDGs in Abuja metropolis with female students having the higher enrolment rate over male students. This result agreed with MDGs (2015) report of, for increased in enrolment rate for every male, there is a female being enrolled into schools. The study also revealed no significant difference found in the performance

based on gender during MDGs. Therefore gender is dependent on performance in Mathematics during MDGs period.

The study similarly revealed a significant difference between the performance of male and female students in mathematics during SDG periods, with male students performing better than female students.

The differences in the performance observed in this study was also agreed with the findings of other researchers such as Kurumeh, etal., (2013) in the study to investigate the differences in the Mathematics and science performance of single-sex schools and mixed school in Makurdi Local Government Area of Benue State. The study established among others the existence of significance difference in both Mathematics and Science performance and between single-sex and mixed schools all in favour of male students.

Conclusion

The results from the findings revealed a progressive increased in enrolment rate for male and female Mathematics students in the last three years of MDGs and the first three years of SDGs programme with the female students having higher enrolment rate over the male during MDGs and SDGs period. Significant difference was also observed between male and female students performance during SDG period, with male students performing better than female students. Therefore the increased in the enrolment rate for both gender observed in the study does not reciprocate their performance during the SDGs period.

Recommendations:

The following recommendations were made based on the finding

(i) The present policy that sustained the progressive increased in enrolment rate for both male and female students during the MDGs and SDGs programmes in Abuja metropolis should sustained and as well as extend to other states in Nigeria.

(ii) More qualified Mathematics teachers should be recruited in proportion to increased number of students in Nigerian schools to ensure the teacher and students' ratio of 1:50 for secondary school as enshrined in National policy of Education (FRN, 2004).

(iii) The role of Mathematics to the national development should not be silent among the global goals like MDGs and SDGs, but its role should be well defined among other SDGs visible goals in Nigeria.

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SCIENCE PROCESS SKILLS PERCEIVED DIFFICULT TO TEACH BY UPPER BASIC SCIENCE TEACHERS IN KWARA STATE, NIGERIA

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Abstract
Effective teaching and learning of basic science require an understanding of Science Process Skills (SPS) to guarantee meaningful learning. The focus and objective of this study was to investigate the science process skills perceived difficult to teach by upper basic science teachers in Kwara State, Nigeria. Specifically, the objectives of this study were to investigate the perceptions of upper basic science teachers in Kwara State on: (i) the science process skills perceived difficult to teach; (ii) the reasons adduced for perceiving them as difficult to teach or not difficult to teach and (iii) the influence of teachers experience on the science process skills perceived difficult to teach. The study was a descriptive research of the survey type. The population for the study was all upper basic science teachers in Kwara State. A sample of 1005 upper basic science teachers, drawn from three Senatorial Districts of Kwara State, Nigeria, was used to obtain needed data, the percentage, and Chi-square statistics were used to test the hypotheses. Findings of the study were that: Upper basic science teachers perceived science process skills to be difficult to teach; Reasons adduced by the teachers for perceiving the process skills difficulty to teach were the complexity of the process skills (27.41%), abstractness (24.48%), and lack of practical skills (21.59%);Teachers' years of teaching experience have no significant influence in their perceptions of upper basic science teachers on the difficulty in teaching science process skills; Teachers' years of teaching experience significantly influenced their reasons adduced for perceiving science process skills to be difficult to teach. The study concluded that basic science teachers in Kwara State, Nigeria perceived SPS difficult to teach and teachers" years of teaching experience significantly influenced their reasons adduced for perceiving science process skills to be difficult to teach. The implication is that teachers might find it difficult to impart science process skills on the students as they do not understand the SPS. The study recommended that adequate training should be given to teachers on SPS, irrespective of gender stereotype, to foster an in-depth understanding of the skills.

Keywords: Teaching Experience, Science Process Skills (SPS), Perception, Difficult, Upper Basic, Science Teachers.

Introduction

Nigeria, like any other developing nation of the world, needs to create a society that is scientifically oriented, progressive and knowledgeable. That is, a nation that has a high capacity for change and forward-looking, innovative and capable of contributing to the scientific and technological developments in the future. In this connection, there is a need to produce citizens who are creative, inquisitive, open-minded and competent in science and technology (Adeyemi, 1999). Ogunleye (2001) observed that the level of technological development of a society is a measure of the level of scientific literacy obtainable in that society. Although the crave for scientific and technological advancement by Nigerians has been a common issue in the society; the aspiration of the country to launch itself into the

mainstream of scientific achievers cannot be accomplished unless science is taught and learned in a better and fascinating practical form (Adeyemi, 1999). One of fundamental approaches for the effective teaching of science and development of technology in any society is an application of science process skills.

Karsli, Sahin and Ayas (2010) stated that science process skills are the skills used by scientists for composing knowledge, thinking of problems and making conclusions. Science process skills are commonly used as popularized by the curriculum project, Science--A Process Approach (SAPA). Science Process Skills were grouped into types--basic and integrated skills. The basic skills provide the foundation for learning the complex skills. This may be probably one of the reasons why educators have been showing tremendous concern on students' attitudes to the learning of science subjects in Nigeria (Afolabi & Ige, 2007).

For educators to teach these science process skills effectively, it is required that they have a good understanding of them and be able to identify the different Science Process Skills that constitute procedural understanding, as well as to plan and provide opportunities for learners to practice these skills individually within activities where learning intentions are related explicitly to the chosen process skills (Ward, Roden, Hewlett & Foreman, 2008). Therefore, the use and development of science process skills at the classroom level will be influenced by the educator's views of these domains, as well as their understanding about the basic skills to be taught. That is so because educators with a particular understanding of these skills will consciously or unconsciously shape their teaching in line with this understanding or view (Wenham, 2005).

Ron (2008) opined that learning affects our perceptions. This is because once you learn something; it is catalogued in your brain forever. He added that as we grow up, we learn either by doing, figuring out or we are taught what we need to know. Perception also influences the difficulty in the acquisition of knowledge.

Difficult topics or concepts as perceived by teachers are always reflected in their teaching. The difficulty of a topic or concept either in teaching or learning is a familiar issue to early research. Researchers' views have earlier showed that teacher/students perceived some branches of science difficult. Among these are Opobiyi (1996) difficulties in chemistry Okpala (1985), Fakuade (1973) difficulties in mathematics and Ogunniyi (1977) difficulties in scientific concepts.

Experience in any profession is considered as an asset. Lieberman (2000) reported that the experience of a teacher gives confidence and improves performance in teaching, motivating, encouraging and leading students. According to Ogunleye, (2005) teachers' qualification and experience havea strong connection with their performance in job.

Submitting, Awoyemi (1985) concluded that teachers are generally effective within the first ten years of teaching experience, while anything outside ten years, there is a tendency for a slight decline in productivity.

It is impossible for students to obtain needed information without having the necessary skills in any of the sciences and technological disciplines (Karsli, Sahin, & Ayas, 2010). Hence, there is the need for science teachers to acquaint science students, irrespective of their gender, with the necessary skills to acquire scientific knowledge, technological skills and not just to teach the concepts alone.

Due to the experience played by upper basic school science teachers in the teaching of science process skills perceived difficult to teach, experience is worth investigating.

Statement of the Problem

Science process skills are very fundamental to science teaching and learning but there is still a serious educational gap in bringing these skills into the classroom for both teachers' and students' acquisition (Harlen, 1999). Science process skills are considered as a major goal for the teaching of basic science, since science education enhances the learners' ability to learn with meaningful understanding.

Purpose of the Study

The main purpose of this study was to find out science process skills perceived difficult to teach in basic science by upper basic school science teachers in Kwara State, Nigeria.
Specifically, the study investigated the:

(i) perceptions of upper basic science teachers on science process skills difficult to teach in Kwara State, Nigeria;
(ii) reasons adduced for perceiving science process skills difficult to teach by the upper basic science teachers in Kwara State, Nigeria;
(iii) influence of teachers' years of teaching experience on the perceptions of upper basic science teachers on science process skills difficult to teach in Kwara State, Nigeria.

Research Questions

The following research questions were raised to guide the conduct of this study.

(i) what are the perceptions of upper basic science teachers on science process skills difficult to teach in Kwara State, Nigeria?;
(ii) what are the reasons adduced for perceiving science process skills difficult to teach by the upper basic science teachers in Kwara State, Nigeria?;
(iii) do teachers' years of teaching experience influence the perceptions of upper basic science teachers on science process skills difficult to teach in Kwara State, Nigeria?;

Research Hypotheses

The following research hypotheses were tested in this study:

$H0_1$: there is no significant difference in the perceptions of upper basic science teachers and science process skills difficult to teach based on teachers' years of teaching experiences in Kwara State, Nigeria.;

$H0_2$: There is no significant difference in the perceptions of upper basic science teachers and the reasons adduced for perceiving science process skills difficult to teach based on teachers' years of teaching experiences in Kwara State, Nigeria.;

Methodology

This study was a descriptive research using survey type. The population for this study comprised all the public upper basic science teachers in Kwara State, Nigeria. Proportionate, simple random and purposive sampling techniques were used for selecting sample for this study. The proportionate, simple random sampling technique was used for selecting the schools in order to have representation in each of the Senatorial Districts. The instruments used in this study was a researcher-developed questionnaire entitled "Teachers Perceptions on difficulty of Science Process Skill (TPSPS)"

The data collected was analyzed using descriptive statistics of the percentage to answer research questions and inferential statistics of Chi-square analysis to test research hypotheses.

Results

Research Question 1: What are the perceptions of upper basic science teachers on science process skills difficult to teach in Kwara State, Nigeria?

The responses of the respondents to research question one are presented in Table 1. 419 (41.69%) perceived all the fifteen listed science process skills as not difficult to teach, 322 (33.03%) of the sampled upper basic science teachers perceived all fifteen science process skills as moderately difficult to teach. Also, 196 (19.50%) perceived all the fifteen science process skills as difficult to teach, while 68 (6.77%) upper basic science teachers sampled perceived all the fifteen science process skills as very difficult to teach.

Therefore, the findings from Table 1 shows that majority of sampled upper basic science teachers (58.31%) perceived all the fifteen science process skills difficult to teach, while (41.69%) perceived science process skills not difficult to teach.

Table 1
Perceptions of Upper Basic Science Teachers on Science Process Skills Difficult to Teach

S/N	ITEMS	ND	MD	D	VD	df	χ^2_{cal}	χ^2_{tab}	Remark
1.	Observing	393 (39.10)	349 (34.70)	233 (23.20)	30 (3.00)	3	314.16	7.82	S
2.	Classifying	596 (59.30)	349 (34.70)	45 (4.41)	15 (1.50)	3	902.53	7.82	S
3.	Inferring	393 (39.10)	349 (34.70)	233 (23.20)	30 (3.00)	3	314.16	7.82	S
4.	Predicting	366 (36.40)	391 (38.90)	218 (21.70)	30 (3.00)	3	329.37	7.82	S
5.	Measuring	725 (72.10)	205 (20.40)	45 (4.50)	30 (3.00)	3	1265.94	7.82	S
6.	Communicating	379 (37.70)	282 (28.10)	192 (19.10)	148 (14.70)	3	123.30	7.82	S
7.	Control variable	309 (30.70)	318 (31.70)	364 (36.20)	14 (1.40)	3	318.47	7.82	S
8.	Interpreting data	466 (46.40)	260 (25.90)	206 (20.50)	73 (7.30)	3	305.64	7.82	S
9.	Making operational definition	278 (27.70)	480 (47.8)	232 (23.10)	15 (1.50)	3	434.73	7.82	S
10.	Formulating Hypotheses	293 (29.2)	288 (28.70)	263 (26.20)	161 (16.00)	3	45.28	7.82	S
11.	Experimenting	419 (41.70)	307 (30.50)	250 (24.90)	29 (2.90)	3	320.97	7.82	S
12.	Counting Numbers	584 (58.10)	248 (24.70)	102 (10.10)	71 (7.10)	3	658.70	7.82	S
13.	Raising questions	508 (50.5)	309 (30.70)	101 (10.10)	87 (8.70)	3	472.87	7.82	S
14.	Manipulative technique	232 (23.10)	276 (27.50)	305 (30.30)	192 (19.10)	3	29.38	7.82	S
15.	Building Mental Models	368 (36.6)	405 (40.30)	145 (14.40)	87 (8.70)	3	300.64	7.82	S
Cumulative		419 (41.7%)	322 (32.5%)	196 (19.5%)	68 (6.7%)	3	277.73	7.82	S

Key: ND (Not Difficult to Teach), MD (Moderately Difficult to Teach), D (Difficult to Teach) and VD (Very Difficult to Teach).

Research Question 2: What are the reasons adduced for perceiving science process skills difficult to teach by the upper basic science teachers in Kwara State, Nigeria?

The responses of the upper basic science teachers to research question two are presented in Table 2, the benchmark considered for the reasons adduced as significant, i.e., Any reason $\geq$ 20% was the level of acceptance.

From the analysis in Table 2, 276 (27.46%) upper basic science teachers adduced the reasons for perceiving all the listed fifteen science process skills difficult to teach as due to complexity of the skill, 246 (24.48%) as due to abstractness of the skill. Also, they adduced lack of practical skills (21.59%), while 186 (18.51%) adduced the reasons for perceiving science process skills as due to unavailability of laboratory facilities and 80 (7.96%) of the upper basic science teachers sampled adduced the reasons for perceiving science process skills as due to the fact that teachers did not train in science process skills during teacher education.

Therefore, the findings in Table 2 show that the most significant reasons why basic science teachers in Kwara State had difficulty in teaching science process skills were complexity (27.46%), abstractness (24.48%) and lack of practical skills (21.59%).

Table 2:Perceptions of Upper Basic Science Teachers on the Reasons Adduced for Perceiving Science Process Skills Difficult to Teach

S/N	ITEMS	CS	AS	LS	UF	TN	df	χ^2_{cal}	χ^2_{tab}	Remark
1	Observing	55	99	411	274	166	4	409.82	9.49	S
2	Classifying	48	95	417	281	164	4	443.13	9.49	S
3	Inferring	394	248	217	117	29	4	379.87	9.49	S
4	Predicting	204	410	217	89	85	4	347.99	9.49	S
5	Measuring	353	246	175	173	58	4	234.80	9.49	S
6	Communicating	249	363	176	173	44	4	271.67	9.49	S
7	Controlling variable	333	296	187	87	102	4	245.98	9.49	S
8	Interpreting Data	322	159	190	249	85	4	160.63	9.49	S
9	Making Operational definition	364	276	145	177	43	4	302.84	9.49	S
10	Formulating Hypotheses	336	220	233	201	15	4	269.68	9.49	S
11	Experimenting	321	222	189	244	29	4	230.94	9.49	S
12	Counting Numbers	348	279	159	177	42	4	275.19	9.49	S
13	Raising Questions	277	381	131	174	42	4	343.71	9.49	S
14	Manipulative technique	349	221	232	116	87	4	216.35	9.49	S
15	Building mental models	176	161	189	261	218	4	31.13	9.49	S
	Cumulative	**276 (27.5%)**	**246 (24.5%)**	**217 (21.6%)**	**186 (18.5%)**	**80 (7.9%)**	**4**	**113.29**	**9.49**	**S**

Key: CS (Complexity of Science Process Skill), AS (Abstractness of Science Process Skill), LS (Lack of Practical Skill), UF (Unavailability of Laboratory Facilities) and TN (Teachers did not Learn Science Process Skills)

Research Question 3: Do teachers' years of teaching experience influence the perceptions of upper basic science teachers on science process skills difficult to teach in Kwara State, Nigeria?;

Table 3 shows that there is no significant difference in the perceptions of upper basic science teachers on the difficulty in teaching science process skill based on teaching experience. The Chi-square value is as follows $\chi^2(6)=\chi^2_{cal}25.28>\chi^2_{tab}12.59$. Since the calculated χ^2 value which is 25.28 is greater than the table χ^2 value which is 12.59.it

means that there is no significant difference in the perceptions of upper basic science teachers on the difficulty in teaching science process skills based on teachers' years of teaching experience. The null hypothesis formulated therefore not rejected.

Out of fifteen items considered for the analysis, eleven of the items showed no significant differences in the perceptions of upper basic science teachers on the difficulty in teaching science process skills based on teachers' years of teaching experience. The eleven science process skills are observing, classifying, inferring, predicting, measuring, controlling variable, operational definition, formulating hypothesis, experimenting, manipulative technique and building mental models.

While 4 of the items contributed significantly are: communicating, interpreting data, counting numbers and raising questions.

i-square Analysis on the Perceptions of Upper Basic Science Teachers on the Difficulty in Teaching Science Process Skills Based
achers' Years of Teaching Experience

	Less Experienced Observed and Expected				Moderately Experienced Observed and Expected				Experienced Observed and Exp		
ITEM	**ND**	**MD**	**D**	**VD**	**ND**	**MD**	**V**	**VD**	**ND**	**MD**	
ing	249 (234.00)	120 (138.20)	88 (93.20)	75 (66.70)	141 (159.60)	107 (94.30)	72 (63.60)	75 (66.70)	52 (48.40)	34 (28.60)	(1
ving	252 (231.00)	117 (139.20)	92 (97.40)	71 (63.50)	138 (158.20)	110 (95.00)	74 (66.50)	41 (43.30)	48 (47.90)	36 (28.80)	(2
ng	122 (136.60)	251 (235.60)	86 (94.80)	73 (65.10)	108 (93.20)	138 (160.70)	75 (64.70)	42 (44.40)	28 (28.20)	56 (48.70)	(1
ing	256 (238.20)	132 (132.90)	86 (96.90)	74 (64.10)	138 (162.50)	107 (90.70)	79 (66.10)	39 (43.70)	56 (49.30)	28 (27.50)	(2
ring	132 (130.20)	248 (238.20)	88 (92.60)	64 (70.90)	88 (88.90)	138 (162.50)	74 (63.20)	63 (48.40)	26 (26.90)	64 (49.30)	(1
unicating	237 (242.40)	156 (144.00)	84 (84.00)	55 (60.90)	164 (165.40)	87 (98.20)	61 (57.80)	51 (41.50)	57 (50.10)	29 (29.80)	(1
lling variable	30 (40.80)	501 (60.90)	284 (267.30)	167 (163.00)	34 (27.80)	46 (41.50)	178 (182.40)	105 (111.20)	13 (8.40)	18 (12.60)	(5
eting data	246 (257.30)	208 (193.20)	57 (59.30)	21 (22.20)	190 (175.50)	115 (131.80)	43 (40.50)	15 (15.20)	50 (53.20)	42 (40.00)	(1
ional on	257 (254.60)	214 (195.90)	46 (53.50)	15 (28.10)	160 (173.70)	125 (133.60)	46 (36.50)	32 (19.10)	64 (52.60)	31 (40.50)	(1
ating esis	14 (28.10)	28 (55.10)	284 (271.00)	206 (177.90)	31 (19.10)	62 (37.60)	176 (184.90)	94 (121.40)	8 (5.80)	14 (11.40)	(5
menting	151 (176.60)	298 (269.40)	52 (55.60)	31 (30.70)	146 (120.30)	163 (183.80)	36 (37.90)	18 (20.90)	36 (36.40)	48 (55.70)	(1
ng Numbers	264 (263.10)	189 (193.20)	64 (57.70)	15 (18.00)	171 (179.50)	142 (131.80)	36 (39.40)	14 (12.30)	62 (54.40)	34 (40.00)	(1
Questions	268 (259.90)	181 (187.90)	65 (60.30)	18 (23.80)	165 (177.30)	138 (128.20)	38 (41.20)	22 (16.30)	58 (53.70)	36 (38.90)	(1
lative ques	18 (31.80)	64 (73.60)	246 (234.00)	204 (192.70)	33 (21,70)	58 (50.20)	178 (159.60)	124 (131.50)	9 (6.60)	17 (15.20)	(4
g Mental	14 (27.50)	28 (25.50)	206 (201.70)	284 (257.30)	32 (18.80)	46 (31.10)	125 (137.60)	160 (175.50)	6 (5.70)	12 (9.40)	(4
lative	**81 (108.00)**	**284 (254.10)**	**106 (111.20)**	**61 (58.80)**	**97 (73.70)**	**148 (173.40)**	**76 (75.90)**	**42 (40.10)**	**26 (22.30)**	**48 (52.50)**	**(2**

Table 3: Chi-square Analysis on the Perceptions of Upper Basic Science Teachers on the Difficulty in Teaching Science Process Skills Based on Teachers' Years of Teaching Experience

S/N	ITEM	Df	χ^2_{cal}	χ^2_{tab}	Remarks
1.	Observing	6	14.11	12.592	NS
2.	Classifying	6	16.45	12.592	NS
3.	Inferring	6	15.13	12.59	NS
4.	Predicting	6	19.13	12.59	NS
5.	Measuring	6	21.73	12.59	NS
6.	Communicating	6	7.68	12.59	S
7.	Controlling variables	6	15.58	12.59	NS
8.	Interpreting data	6	6.02	12.59	S
9.	Operational definition	6	26.65	12.59	NS
10.	Formulating Hypothesis	6	56.99	12.59	NS
11.	Experimenting	6	20.08	12.59	NS
12.	Counting Numbers	6	6.11	12.59	S
13.	Raising Questions	6	6.89	12.59	S
14.	Manipulative Techniques	6	18.38	12.59	NS
15.	Building Mental Models	6	40.02	12.59	NS
	Cumulative	*6*	*25.28*	*12.59*	*NS*

Summary of Findings

The finding of this study revealed that upper basic science teachers in Kwara State, Nigeria perceived science process skills difficult and complexity was the reason adduced for perceiving SPS difficult to teach.

Discussion

Findings from the study revealed that the analysis of the results revealed that science process skills were perceived difficult to teach by upper basic science teachers. The perceptions of the teachers also varied due to the low capability to teach science process skills. This shows that upper basic science teachers understand the science process skills and they should not relent on the method used in teaching the skills. This finding is in line with Ogunkola and Samuel (2011) who found that there was no significant difference in the perceptions of difficult science topics based on gender.

Findings reveal that, the most frequent reasons given by upper basic science teachers for perceiving science process skills difficult to teach include: Complexity of science process skills, Abstractness of science process skills, Lack of practical skills. This finding is in agreement with Harlen (1999) who found that at different stages, the challenges of science process skills are

due to its complexity in nature, abstractness, minimal attention to practical methods and science teachers' specialization.

Conclusion

From the findings and discussions, the following conclusions were arrived at;
Majority of the upper basic science teachers in Kwara State, Nigeria perceived science process skills difficult to teach.

Complexity, abstractness of SPS and lack of practical skills make it difficult for teachers to teach.

Teachers' perceptions of the difficulty in teaching science process skills were independent of teachers' years of teaching experience.

Reasons adduced for the difficulty in teaching science process skills varied based on experience.

Recommendations

(i) Teachers need to pay more attention to difficulty in teaching of science process skills for an in-depth understanding so that teaching Science Process Skills would not remain a herculean task.
(ii) The upper basic science teachers should be equipped with mental cognitive tools such as study technology so as to enable them to carries out effective teaching of the skill and this could reduce the reasons for perceiving the skills difficult, especially complexity, which has the highest percentage, among others.
(iii) Upper basic science teachers in Kwara State should strive to update their knowledge of science teaching and improve their pedagogical skills by attending seminars/workshops and in-service training organized by professional bodies.

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EFFECT OF TEACHER ENTHUSIASM ON MATHEMATICAL ACHIEVEMENT; THE IMPACT OF MATHEMATICAL CREATIVITY

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Abstract

Mathematical achievement is an end result of teaching and learning at the basic levels of schooling. A student is expected to have at least a credit pass in Mathematics to proceed to higher levels of education. To contribute meaningfully to a rapidly changing world of technological advancement mathematical knowledge is very vital. Over the years it has been a source of concern to stakeholders in the education industry that students have low interest and achievement in mathematics. Hence, research is always ongoing on ways and methods for combating and reversing this problem. Mathematical creativity and Teacher enthusiasm are two constructs that have been examined independently in relation to mathematical achievement in developed countries. Nevertheless, studies that link mathematical creativity to teacher enthusiasm have not been explored. In addition, studies on the area of mathematical creativity have not been seen particularly in the area of secondary school education in Nigeria, where mathematical achievement has seen a steady decline. This study seeks to examine the relationship that exists between mathematical creativity, teacher enthusiasm and mathematical achievement of students at the senior secondary level in Federal Unity Colleges in North-Central Nigeria using structural equation modeling. Measurement items, which comprise of a self-report questionnaire for teacher enthusiasm (TEN), tests for Mathematical Creativity (MC) and test for Mathematical Achievement (MA) were administered to 2041 students in senior secondary sections in Federal Unity Colleges in North Central Nigeria. Exploratory and confirmatory analyses were carried out using the Analysis of moment structure (AMOS) tool. The findings of the study showed that MC had a total mediating effect on TEN to MA, while the direct relationship between TEN and MA had an infinitesimal coefficient weight. This study contributes to the growing research on the need for Mathematical creativity in our classroom and its effect on students' mathematical achievement and teacher enthusiasm.

Introduction

Mathematics is a core subject offered by students all over the world at the basic levels of education. Without a credit pass in mathematics, a student will find it difficult to proceed to tertiary education. A disconnect seems to exists between mathematics as taught in the classroom and the mathematics needed for everyday life. Teaching strategies and methodologies used in teaching mathematics in our schools mostly do not encourage our students to think independently (Mann, 2005). This makes students develop fear and anxiety towards mathematics as a subject, leading to loss of interest, and hinders their achievement in Mathematics. This is a source of concern to all stakeholders in the education sector; hence, the continuous research on strategies to combat this phenomenon. In the twenty-first century, skills such as creativity have been advocated as necessary for students to be able to contribute

meaningfully to technological development in the larger society beyond the classroom (Plucker & Esping, 2015).

Students often describe mathematics as a rigid subject that gives few opportunities for them to think and express themselves. Their perceptions about mathematics are connected to their mathematics teachers and their mode of instruction (Kunter et al, 2011). Students rated enthusiasm as very important when they were asked to list characteristics they felt were necessary for their teachers to be highly effective (Keller et al, 2013). Teacher enthusiasm is said to foster students learning and motivation. From previous research on teacher enthusiasm, there has been a call for studies with regard to mediators or moderators that influence the relationship between teacher enthusiasm and student achievement in order to determine the effects as well as the direction of causation (Keller et al, 2016).

In this study, mathematical creativity is proposed as a mediator between teacher enthusiasm and mathematical achievement based on the premise that enthusiastic teachers are more likely to foster theirstudent's mathematical creativity and their mathematical achievement in the end.

The present study aims at exploring the effect of mathematical creativity on teacher enthusiasm and mathematical achievement of students in federal unity college, north-centralNigeria**.** Based on this theoretical framework the study posits that (i) teacher enthusiasm has a significant relationship with the mathematics creativity of students (ii) mathematical creativity of students mediates the relationship between teacher enthusiasm and mathematical achievement of students.

Theoretical Background

Teacher enthusiasm is described in instruction as lively nonverbal behaviours that show the excitement and joy of a teacher in teaching a particular subject (Keller et al, 2016). From prior research carried out particularly at the tertiary level, students opined that enthusiastic teachers encouraged their students to participate actively in class, which motivated them to learn (Freudenberg &Samarkovski, 2014). The enthusiasm of a Teacher can spread to students and ignite their interest in the subject area leading to students' achievement. An enthusiastic teacher is expected to be an effective teacher with in-depth knowledge of the requisite subject area (Freudenberg &Samarkovski, 2014). The mathematical creativity of students is defined as the process of forming new questions that that would result in a novel, insightful and useful solutions to a problem (Shirki, 2010). At the schoollevel, mathematical creativity is usually identified with problem posing or problem-solving (Posamentier, Smith &Stepelman, 2010). To develop students who are mathematically creative, mathematics teachers have a vital role to play the creative mathematics experiences of the teachers themselves and their beliefs about creativity would determine how much effort they would put into creative mathematical activities in their classrooms for the development of mathematical thinking of their students (Sinitsky, 2008).

Social cognitive theories and the systems theory of creativity provide a theoretical framework for how enthusiastic teaching and creativity of the students could be related towards the better mathematical achievement of students(Starko, 2005; Frenzel et al,2009; Gras, Bordoy, Ballesta&Berna,2010; Pekrun et (,2009). Empirical evidence supports the relationship between teacher enthusiasm and students learning (Aschenbrener, 2008) other studies have discovered the relationshipbetween mathematical creativity and mathematical achievement (Mann, 2005;

Lev & Leikin, 2013). However, there is a lack of empirical evidence documenting relationships between teachers' enthusiasm and mathematical creativity of the students and between teacher enthusiasm, mathematical creativity, and mathematical achievement.

Methodology

A quantitative non-experimental causal-comparative research design was adopted for this study. The use of this design is supported by the assertion that a substantial proportion of quantitative educational research is non-experimental because many important variables of interest in educational research cannot be manipulated (Belli, 2008). The study depicts a complex causal model of direct and indirect causal relationship between teacher enthusiasm, mathematical creativity, and mathematical achievement. Students in the first year of Senior Secondary School (SS1) in Federal Unity Schools in North Central Nigeria, represent the population used in this study. 2041 students from 12 secondary schools participated in the study. These schools all fall within the North Central Zone of Nigeria. The age of the students ranges from 12 years to 19 years with an average age of 14 years. Summary of the research instruments is presented in Table 1.

Table 1: Description of the Research Instruments

Construct and Sources	Description
Mathematical Creativity (Adapted questions from mathematics creativity scale Akgul,2016)	1 convergent thinking question and 4 divergent thinking questions requiring multiple solutions
Teacher Enthusiasm (Adapted from enthusiasm awareness index)(Gabryś-Barker,2014)	My teacher maintains eye contact with us while teaching
	My teacher's facial expression while teaching is pleasant
	My teacher demonstrates with hand gesture while teaching
	My teacher does not read directly from notes or books while teaching
	My teacher is active and excited about what is being taught
	My teacher immediately notices when we stop paying attention
Mathematical Achievement (Adopted questions from past question papers of NECO& WAEC examinations councils.)	10 questions on number and numeration,8 questions on algebraic processes and 2 questions on geometry

A pilot test on the instruments was carried out to obtain the reliability of the instruments. A 5-point Likert scale was used for the questionnaire items. Two tests were used: the mathematics achievement test and the mathematical creativity test. The mathematical creativity test included one convergent and four divergent open-ended multiple-solution mathematical tasks, in which the students were asked to, provide multiple solutions which were different from each other; and different from the answers given by their peers.

Mathematical achievement as used in this study was measured using the students' results in standardized questions set by the external examination bodies National Examinations Council (NECO) and West African Examinations Council (WAEC) in Nigeria. Each student was given 50-minutes, and 30-minutes to complete the mathematical creativity test, and the mathematical achievement test respectively. All statistical analyses were conducted with a significance level of 0.05. In order to evaluate the measurement and structural model, the analysis of the moment structure (AMOS) tool version 18 was used. Metrics of evaluation include the comparative fit indices (CFI), the goodness of fit indices (CMIN/DF), and the root mean square error of approximation (RMSEA). These metrics are the generally utilized metrics for evaluating the structural model.

Result and Analysis

The technique utilized to address missing data in the data collection was the Missing Completely At Random (MCAR) technique. This technique provided a baseline for data imputation and the data collection satisfied the conditions for data input. A descriptive statistic of the data is shown in Table 3. The responses on the Teacher Enthusiasm (TEN) questionnaire showed a higher mean-score when compared to the mean score of the mathematical creativity test (MCT). However, most items in the TENwere negatively skewed relative to the MCT item skewness. The reliability of the teacher enthusiasm and mathematical creativity test (MCT) items were observed to be 0.779 and 0.6113 respectively. One item in the MCT was observed to negatively affect the reliability scale during the exploratory factor analysis. Further evaluation of this observation was performed during the structural analysis.

Table 2: Descriptive Statistics

Items	N	Minimum	Maximum	Mean	Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
TEN1	2041	1	11	3.665	1.2299	1.513	-0.678	0.054	0.247	0.108
TEN2	2041	1	5	3.659	1.1341	1.286	-0.802	0.054	0.015	0.108
TEN3	2041	1	5	4	1.0493	1.101	-1.234	0.054	1.107	0.108
TEN4	2041	1	5	3.952	1.0486	1.1	-1.158	0.054	1.036	0.108
TEN5	2041	1	5	4.047	1.1274	1.271	-1.327	0.054	1.07	0.108
MCTI1	2041	1	5	1.643	0.9482	0.899	1.127	0.054	0.037	0.108
MCTI2	2041	1	5	1.974	1.2638	1.597	1.083	0.054	-0.075	0.108
MCTI3	2041	1	74	3.535	1.9756	3.903	22.064	0.054	793.11	0.108
MCTI4	2041	1	5	2.307	1.5525	2.41	0.65	0.054	-1.21	0.108
MCTI5	2041	1	5	1.332	0.7864	0.618	2.84	0.054	8.152	0.108

Using the thumb rule for the goodness of fit indices as defined in Hair et al (2010) the proposed structural model was evaluated. The result, as shown in Table 4, revealed that the proposed model satisfies the goodness of fit indices thumb rule. Based on this observed result, the structural model, as shown in Figure 2, was developed. The standardized regression weight, with coefficient of 0.04, showed a statistically insignificant direct relationship between teacher enthusiasm (TEN) and mathematical achievement (MAT). However, a statistically significant

relationship was observed between teacher enthusiasm and mathematical achievement through mathematical creativity. The observed standardized regression weight for the significant relationship (TEN to MAT through MCT) was 0.49. Generally, a factor loading lesser than 0.3 is considered poor in a structural model (Hair et al, 2010). As shown in Figure 2, two items, MCT item-1 and item-3, are lower than 0.3. The authors observed that deleting the item from the model made no significant impact on the overall outcome of the model. Thus, the items were kept in the structural model. The factor loading of other items remains above the 0.3 benchmarks. This further suggests that the model has a good fit.

Table 3: Measurement Model evaluation

Indices	**Thumb rule (N>=250, m<=30)**	**Obtained result**
CMIN/DF	≤3.000	1. 830
CFI	≥0.920	0.990
RMSEA	≤0.070	0.020

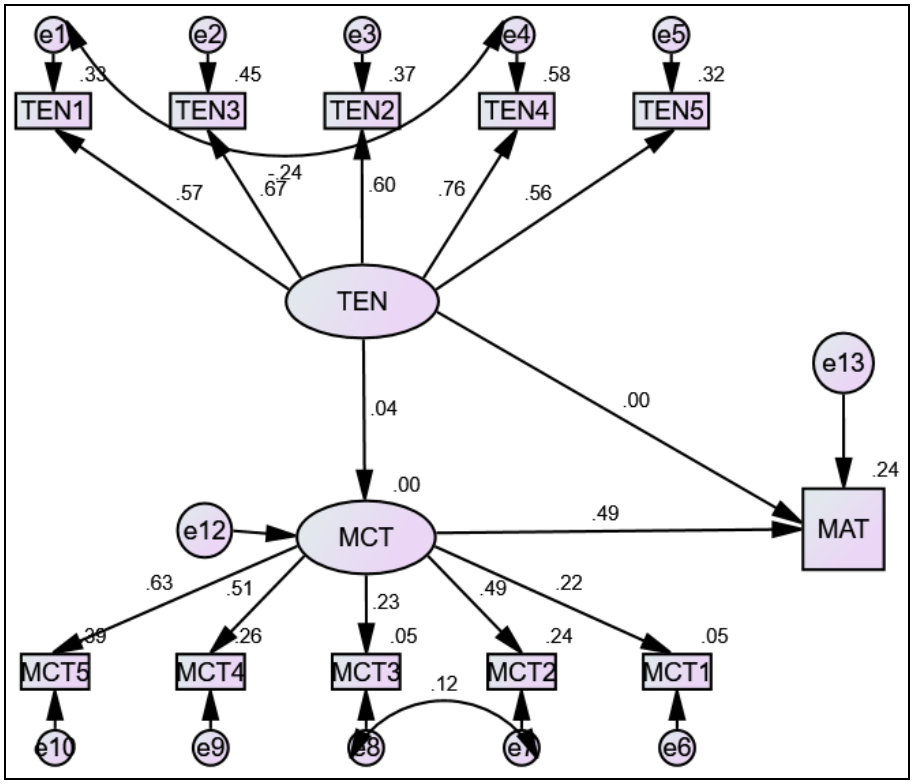

Figure 2: Structural Model for TEN, MCT and MAT Relationship

Discussion

Leveraging the theoretical supposition from studies on the relationship between mathematical achievement and Mathematical creativity, this study asserts that mathematical creativity (MC) can mediate the effect of Teacher enthusiasm (TEN) on mathematical achievement (MA). This underlying assumption is further established in this study. The result presented in Table 4 shows that the suggested relationship among the observable variables; MA, MC, and TEN, can be structurally modelled to reveal either causation or indirect relationship. From the result shown in Figure 2, there was no direct relationship between Teacher enthusiasm and

mathematical achievement of students in Federal Unity Colleges in North-Central Nigeria. This observation contrasts observation in existing studies, as further highlighted. However, the converse was observed for the indirect relationship through mathematical creativity. MC provided a complete mediation in the relationship between the TEN and MA. This further suggests that the integration of creativity into mathematics in public schools in North-Central Nigeria could be a potential approach to enhancing Mathematical achievement of students.

The observation from this study supports the findings from previous studies, such as Nami et al (2014), where creativity was asserted to influence mathematical achievement. Furthermore, the result supports the assertion in Mann (2005) where a significant relationship between creativity and achievement was found. However, the result contrasts the finding in Kunter et al (2008) where teachers' enthusiasm had a significant relationship with higher quality instructional behaviour. Although in the review of previous research on the relationship between teacher enthusiasm and academic achievement by Keller et al (2016) they discovered that research outcomes about the relationship between teacher enthusiasm and academic achievement was mixed, some studies found positive effects while others found no significant effect. In summary, the current study attempted to explore the relationship between mathematical achievement, mathematical creativity, and Teacher enthusiasm. Unlike other studies, this study utilized structural equation modeling approach to validate the theoretical underpinning and discovered the mediating effect of mathematical creativity on the relationship between mathematical achievement and teacher enthusiasm. The use of structural equation modeling presents a logic for extracting causal relationships among observable variables. Though Mathematical Creativity cannot be affirmed to be a causal factor for Mathematical Achievement, it can be stated that the incorporation of Mathematical creativity into our classrooms would be a measure for enhancing MA. This is necessary for most developing nations, particularly in North Central Nigeria where the decline in MA presents a major problem for educators. If the critical thinking skills and problem-solving abilities of the students are fostered, it will help learners to understand and actively participate in today's global perspectives and dynamics. The concept of mathematical creativity can be contextually designed to fit into the existing national curriculum without discarding the existing curriculum. In addition, a learner-centered method of teaching with enthusiastic teaching being encouraged should be used. Furthermore, the relationship observed in this study can be enhanced. Whilst in this study, the mathematical achievement test was based on uncategorized mathematical questions; another approach would be to categorize the mathematical test items into a group of knowledge-areas in mathematics, which can be used to create a robust construct for mathematical achievement. The construct; Teacher enthusiasm, could also be considered from both the perception of the students and a questionnaire for the teachers as well.

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ASSESSMENT OF SCIENCE TEACHERS' LEVEL OF AWARENESS ON LABORATORY MANAGEMENT TECHNIQUES AT SENIOR SECONDARY SCHOOL LEVEL IN FEDERAL CAPITAL TERRITORY, ABUJA,

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Abstract
This paper assessed science teachers' level of awareness on laboratory management techniques in Federal Capital Territory *(FCT) senior secondary schools, Abuja. Survey research design was adopted for the study. A sample of 320 were selected from the population of 1,896 science teachers using simple random sampling technique. Three research questions and two null hypotheses guided the study. A structured questionnaire made up of 20 items was used for data collection. The questionnaire was validated by experts in Science Education and a reliability index of 0.96 was obtained using Cronbach Alpha. Finding of the study revealed that science teachers in FCT have high level of awareness on laboratory management techniques in the areas of ordering, stocking and maintenance of materials while they have low level of awareness on laboratory safety measure. It was also found that male science teachers have higher level of awareness than their female counterparts. Based on the findings, it was recommended among others that science teachers should be exposed to conferences, workshops and seminars to enable them improve on their knowledge of laboratory management techniques.*

Keywords: Assessment, awareness, laboratory management techniques, Science Teachers

Introduction

This is a scientific era where it is expected that everyone would directly or indirectly be influenced by scientific discoveries. Therefore, across the world, science is increasingly being recognized as a subject of life-long utility (Iftekhar, 2013). The success or otherwise of teaching and learning of science depends on several factors among which are the availability of functional laboratory, scientific equipment and the ability of the science teacher to properly manage human and material resources in the laboratory. However, successful teaching and learning of science cannot be achieved without Information and Communication Technologies (ICTs) through the use of manipulating tools, equipment and machines in a functional laboratory setting. A laboratory is a room or building equipped and set apart for practical or experimental studies to take place (Omiko, 2015).

A science laboratory is facility that provides controlled condition in which scientific or technological research, experiments and measurement may be performed. A science laboratory may not be only confined to a room with a sink and fitting for experiments but rather, any place in the field, stream near school, garden or workshop equipped and set aside for the function it is intended to serve (Adams & Salome, 2014). The knowledge of laboratory management is

essential for the correct use of science buildings, installations, machinery and equipment, as well as an economical use of energy, water and other materials in the laboratory. Therefore, science laboratory is very essential in science teaching and places a demand on science teachers to be properly aware of how to manage laboratory effectively.

Science laboratory management is the effective utilization of human and material resources towards achieving the objectives of setting up the place (Samba & Eriba, 2011). It is regarded as those complex activities that involve planning, organization, coordination of equipment and activities in a manner conducive to scientific investigation. Paul (2008) posited that effective laboratory management techniques is a learned skill which involves regular meetings and delegating responsibilities to laboratory staff. Ezeano and Ezeudu (2013) opined that Laboratory management which teachers and technical staff are exposed to include ordering of equipment, storage of materials, safety and maintenance. The management of school laboratory requires the services of qualified science teachers. A science teacher is someone who teaches the principles of different areas of science to students, helps them conduct experiment using the equipment and facilities in the laboratory. The science teacher as a resource manager must train his students in the correct techniques of handling materials, tools and equipment (Muhammad, 2016).

However, some science teachers do not have proper awareness of laboratory management. The major problems facing the teaching and learning of science is connected with the management of available laboratory resources, inability to appropriately manage laboratory resource is a sign of poor management (Muhammad, 2017). The problem then, is to what extent are science teachers aware of laboratory management techniques. Therefore, this study is set to assess science teachers' level of awareness of laboratory management techniques in FCT senior secondary schools, Abuja. It is against this background that this study seeks to assess science teachers' level of awareness of laboratory management in senior secondary schools in the Federal Capital Territory, Abuja.

Aim and Objectives of the Study

The aim of this study is to find out science teachers' level of awareness on laboratory management techniques in FCT senior secondary schools, Abuja. The following specific objectives are formulated to guide the study to:

(i) Determine science teachers' level of awareness on laboratory management techniques in FCT senior secondary schools, Abuja.
(ii) Find out the difference between male and female science teachers' level of awareness on laboratory management techniques in FCT, Abuja.
(iii) Investigate the difference in the level of awareness on laboratory management techniques between science teachers in urban and rural schools of FCT, Abuja.

Research Questions

The following questions are raised to guide the study:

(i) To what level are science teachers aware of laboratory management techniques in FCT senior secondary schools, Abuja?
(ii) What is the difference between male and female science teachers' level of awareness on laboratory management techniques in FCT senior secondary schools, Abuja?

(iii) What is the difference in the level of awareness on laboratory management techniques between science teachers in urban and rural schools of FCT, Abuja?

Hypotheses

The following null hypotheses were formulated and tested at 0.05 level of significance

HO_1: There is no significant difference between male and female science teachers' level of awareness on laboratory management techniques in senior secondary schools in FCT, Abuja.

HO_2: There is no significant difference in the level of awareness on laboratory management techniques between science teachers in urban and rural schools of FCT, Abuja.

Methodology

The study adopted research survey design. According to Nworgu (2015), a survey research design is the one that describes the present status of circumstances or phenomena. The population of the study consisted of all Science Teachers in public senior secondary schools in the six Area Councils of FCT, Abuja. The total number of Science Teachers in FCT, Abuja is 1896 (FCT-SEB, 2018). The sample of the study is 320 Science Teachers selected using simple random sampling technique. This comprised 182 males and 138 females as well as 194 in urban and 126 in rural schools. The sample was determined using Krejcie and Morgan table for determining sample size from a population (Krejcie & Morgan, 1970).

The instrument used for data collection was a structured questionnaire on 5-point rating scale with response options of Not Aware, Slightly Aware, Somewhat Aware, Moderately Aware and Extremely Aware with the weighing of 1, 2, 3, 4, and 5 respectively. In order to take decision as remark, real limits of number was used to indicate the level of awareness with numerical values of 0.5 – 1.49 as Not Aware, 1.5 – 2.49 Moderately Aware, 2.5 – 3.49 Aware, 3.50 – 4.49 Extremely Aware and 4.5 – 5.00 as Very Extremely Aware. The instrument was validated by three experts in Science Education**.** A pilot study was conducted on 40 Science Teachers. The data collected were analyzed using Cronbach Alpha coefficient and the reliability coefficient obtained was 0.96 which shows that the research instrument is appropriate for the study. The questionnaire was administered and collected by researcher and research assistant. Data collected were analyzed using mean, standard deviation and the hypotheses were tested using t-test.

Results

Table 1: Science Teachers' level of awareness on laboratory management techniques

S/N	Items Description	$\bar{x}$	SD	Response
1	Checking for production and expiring dates of reagents or chemicals upon delivery	3.27	0.73	High
2	Ensuring that the reagents and other materials requested for are appropriately supplied	3.03	0.68	High
3	Checking for and rejecting fake laboratory equipment/reagents	3.50	0.61	High
4	Proper recording of items or materials supplied	3.47	0.64	High
5	Awareness of priority placed on items that are ordered	2.93	0.82	Low
6	The standard work space required by each student in the laboratory	3.18	0.67	High
7	Serial arrangement of workbenches allows for free movement and supervision of experiments	3.70	0.59	High
8	Stock book is kept in the laboratory	3.16	0.68	Low
9	Accidents and emergencies are recorded in accidents and	2.50	0.76	Low

first aid book kept in the laboratory				
10	Awareness of how to clean spill toxic acids on the skin to avoid chemical burn	3.63	0.65	High
11	Labeling of reagents or chemicals with name, formular and date	3.21	0.73	High
12	Light objects that are not frequently used are stored on the top level of shelves in laboratory	2.08	0.91	Low
13	Storage of chemicals by families with incompatible chemicals separated from each other	4.16	0.49	High
14	Proper disposal of glassware and used-up chemicals	3.97	0.50	High
15	Damages and breakages book is kept for day to day running of laboratory	2.85	0.84	Low
16	Checking the glassware for cracks and chips each time you use it	2.57	0.80	High
17	Regular checking and servicing of gas and water main tap	3.82	0.53	High
18	Proper orientation/alignment of laboratory reduces wind and enhances visibility in work place	3.76	0.60	Low
19	The procedures involved in using a Bunsen burner to heat H_2O in a beaker	2.16	0.88	High
20	Administration of first aid treatment to a student who is cut by broken glassware	2.91	0.77	High
	Grand Mean	3.19	0.69	High

From the table, science teacher responses on laboratory management techniques show that thirteen (13) out of the twenty (20) items in the instrument pertaining to laboratory management have their mean rating above 3.00. This implies that science teachers have high level of awareness of laboratory management. Conversely, the respondents have low mean scores on the remaining seven (7) items. This indicates that science teachers have low level of awareness of safety aspect of laboratory management.

HO_1: There is no significant difference between male and female science teachers' level of awareness on laboratory management techniques.

Table 2: t-test Analysis of differences between male and female science teachers' level of awareness on laboratory management techniques

Variable	N	Mean	SD	*df*	t-cal	P-value
Male	182	33.91	7.934	318	4.92	.00
Female	138	29.95	5.946			

Table 2 shows t-cal=4.92, df (318), P<.0.05. this meant that P <0.05, therefore the null hypothesis that there is no significant difference between male and female science teachers level of on laboratory management techniques is rejected. There is actually significant difference.

Table 3: t-test Analysis of the difference in the level of awareness on laboratory management techniques between science teachers in urban and rural schools

Variable	N	Mean	SD	df	t	sig
Urban	194	35.162	7.397			

				318	8.011	.000
Rural	126	28.698	6.483			

Table 3 indicates t=8.011, df=318 and p=0.000. Since $p < 0.05$, HO_2 was rejected. Therefore, there is significant difference in location on science teachers' level of awareness on laboratory management.

Discussion

The result of the findings revealed that science teachers in FCT have high level of awareness on laboratory management in the areas of ordering, stocking and maintenance of laboratory equipment. The finding agrees with earlier studies conducted by Ezeano and Ezeudu (2013), that Chemistry Teachers apply laboratory management skills of storage and maintenance of equipment to a reasonable extent. This is also in line with the finding of Udu (2010) that Science Teachers in Ebony State utilized laboratory management skills in the area of maintenance of equipment to appreciable extent. This implies that Science Teachers in FCT have demonstrated similar level of awareness in the ordering, stocking and maintenance of laboratory equipment and organize the laboratories for effective teaching and learning of science.

The finding of this study also revealed that Science Teachers in FCT have low level of awareness of safety aspect of laboratory as shown in table 1. This agrees with the result of Akubuo and Eze (2007) that teachers are not sufficiently skilled in the area of safety. This implies that Science Teachers in FCT are deficient in a number of safety management techniques put in place in the laboratory to guarantee safety of life and longevity of equipment. This is also in agreement with the finding of Achufusi and Ezenduka (2017) that safety equipment is lacking in most biology laboratories, thus limiting the implementation of safety practices to a great extent.

Furthermore, the study found that there is significant difference between male and female science teachers' level of awareness on laboratory management techniques in favor of the male as shown in table 2. The finding is line with that of Udu (2010) which revealed that the male science teachers in Ebonyi State utilized laboratory management skills more than their female counterparts. This implies that gender accounts for differences in science teachers' level of awareness of laboratory management. The finding also agrees with Ibe, Adah and Ihhejiamaizu (2013) who asserted that gender influences teachers' level of competency in the usage and management of laboratory apparatus. This ought not to be so because both teachers passed through teacher education during pre-service training and are exposed to similar training experiences in the institutions.

It was also found that there is significant difference in science teachers' level of awareness of laboratory management based on school location as indicated in table 3. This implies that science teachers in urban schools have higher level of awareness of laboratory management than those in rural schools of FCT, Abuja. The finding is in agreement with that of Ibe, Adah and Ihhejiamaizu (2013) that Chemistry Teachers in urban schools recorded higher mean achievement in identification of the commonly used pieces of laboratory apparatus than those in rural schools. This is an indication that science teachers in rural schools of FCT, Abuja are still lagging behind in terms of laboratory management.

Conclusion

The study which assessed science teachers' level of awareness of laboratory management revealed that science teachers in FCT have high level of awareness of laboratory management in the areas of ordering, stocking and maintenance of laboratory equipment but they have low level of awareness of laboratory safety, and the male and urban science teachers have higher level of awareness of laboratory management than the female and rural science teachers.

Recommendations

Based on the findings of this study, the following recommendations are made:

(i) Science teachers should be exposed to conferences, workshops and seminars to enable them improve on their knowledge of laboratory safety

(ii) Science teachers especially those in rural schools should be involved in routine retraining and symposia on science laboratory management for effective teaching of science.

(iii) There should be regular in-service training for science teachers by team of Inspectorate and Ministry of education to ensure quality science teaching in schools.

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AVAILABILITY, ADEQUACY AND UTILIZATION OF HIGH-TECH ASSISTIVE TECHNOLOGY IN SPECIAL EDUCATION SCHOOLS IN NORTH WEST NIGERIA

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Abstract
This study assessed availability, adequacy and use of high-tech assistive technologies in special education schools in North West Nigeria. The study used descriptive survey method to sought data from 120 teachers who were drawn using simple random sampling technique from teachers of students with physical disabilities. Four research questions were raised to guide the study. Researchers designed questionnaire and observation checklist were used to collect data. The two instruments were subjected to expert assessment for face and content validity check. The reliability of the instruments were established through pilot study using 20 teachers from two special needs schools within the study area, but not part of the sampled schools. The reliability values of 0.80 and 0.74 were obtained for the questionnaire and Checklist using Cronbach Alpha formula and Cohen's Kappa inter-rater reliability formula. The data collected were analysed using percentage, mean and standard deviation. The findings revealed that high-tech assistive technologies were not adequately available in special education schools. The few available assistive devices were not adequate. However, special education teachers do not use the available high-tech assistive devices to teach students with physical disabilities. It was recommended among other things that both the federal and state governments should improve on funding special educationso as to ensure that the necessary assistive devices are made available in special education schools.

Key Words: Availability, Adequacy, Utilization, High-tech, Assistive Technology, Special Education

Introduction

Education is accepted globally as the cornerstone for the advancement of individuals and for national development. For this reasons Nigeria as a nation has emphasised in its National Policy on Education that every child irrespective of location, social, economic or physical characteristics must receive basic education (FRN, 2004). In order to provide efficient and productive education for the citizens, especially in this era of technological advancement, education in all regards need to be integrated with technology that can improve performance capabilities, encourage students' participation in instructional activities and facilitate their overall academic achievement. Thus, technology integration in education encompasses hardware and software applications deeply rooted in Information and Communication Technology (ICT).

Information and Communication Technology cut across wide range of computerised and electronic technologies used in the acquisition, processing, transmission, and storage of information (Adebisi, 2014). Advancement in ICT, its acceptance and use in education is indeed promising.Increasing involvement of ICT in education is bringing changes to the way teachers teach and learners learn. Information and Communication-based Technology is facilitating the growth of special education technology in Nigeria (Felicia, Sharif, Wong & Marriappan, 2014).Implementation of new teaching and learning tools, especially within the scope of special education is a blessing at the right time. Hence, the use of appropriate technological tools,

devices, equipment, and gadgets in the classroom is significant to facilitating effective teaching and learning, which in turn will enhance positive performance and achievement of both instructors and learners. Thus, teacher's ability to integrate technology, pedagogy, and content in his/her classroom is paramount to a successful teaching and learning process.

The term Special education according to the National Policy on Education (2004) is "a customized education programme, designed to meet the unique needs of persons with special needs that the general education programme cannot provide". As a means for meeting special education needs, it is concerned with the elimination of barriers to educational participation. This involves setting the right place with appropriate technologies. Because of the support technologies offered to individuals with disabilities, they are addressed as assistive technology.

In recent years, the concept of assistive technology has emerged to dominate the field of special education. Assistive Technology encompasses any item, piece of equipment or system that helps a child with disability bypass, work around or compensate for the areas of difficulties (Raskind, 2009). Assistive technologies differ widely in quality and effectiveness. Today, different assistive technologies (low-tech, mid-tech and high-tech) are used to provide individuals with disabilities with educational opportunities, bringing out the cognitive potential in them, while enabling the curricula and teachers to achieve their objectives and enable the students with disabilities to participate in the learning process.

Students with disabilities connotes persons who have long-time physical, mental, emotional, or sensory impairments, whose interaction with the different attitudinal and environmental barriers prevent them from full and or effective performance within the classroomon an equal basis with others (Convention on the Rights of Persons with Disabilities, 2016). Students with physical disabilities are just a segment of students with disabilities. Students with physical disabilities are faced with abnormality or loss of function of physical structure. Thus, physical disability whether partial or total loss of ability, reduces the ability of the students to learn freely. Visual impairment, speech impairment, hearing impairment, and mobility limitation are the most common physical challenges found in special needs schools in Nigeria (Adebisi, 2014).United Nations International Children's Emergency Fund and World Health Organization joint report (UNICEF &WHO, 2015) acclaimed the need for the implementation of technology to support them in their functional deficits and to assist them access instruction and thus learn better.

In Nigeria, the provision of assistive technology in special education is significantly left in the hand of the government. Consequently upon this, schools in Nigeria experienced infrastructural decay which has reduced their use in the classroom setting (Shikden, 2015). Notwithstanding this, it is important to note that the use of assistive technologies to facilitate teaching and learning activities within the special education ecosystem cannot be over emphasised. This is because they are considered as students allies capable of enhancing functional capabilities and encouraging their participation in education. Assistive technology helps students with special needs to improve their academic achievement. Nevertheless, not all assistive technologies can offer help to all students with special needs at all time. As students with physical disabilities progresses in learning, their technological needs also increase (Coleman, 2011). Researchers noticed that with the current technological development, traditional assistive technologies are becoming more of crutch than support tools (Rowlands, 2015). Thus, integrating emerging technologies into special education programmes will not only offer help but increase the opportunities of students with disabilities to meeting their educational aspirations.

Because of its potential in improving the living and learning condition of Individuals with disabilities high-tech assistive technology is becoming popular among families of people with disabilities and professional (Adedapo, Nwosu, & Ibitoye, 2009). Hence, for the purpose of facilitating academic achievement of students with physical disabilities in the 21st century, effective and efficient mobilization and utilization 21st century assistive technologies should not be compromised.

Although, there is a gradual involvement, acceptance and utilization of new innovation in Nigeria; it is a mistake to think narrowly about assistive technology in this country (Oyundoyin, 2013).The entire assistive technology spectrum could be obtainable and holds promise for individuals with disabilities in Nigeria. Even though, there is no records indicating the widespread use of emerging phenomenon (high tech assistive technologies) in Nigeria, but index available shows that computers are available for classroom use in special schools. Findings from earlier researches show that students with disabilities use computers as often as their abled peers from the conventional schools. Although computers are the technology most often associated with high tech, there could be many other potentially valuable devices available in Nigeria. Considering its educational significance, it is therefore important that availability, adequacyy and utilization of high-tech AT should be the central focus of stakeholders concerned with development of special education programme in Nigeria.

More so, as an emerging technology, there are still a little quantitative evaluations of their availability, adequacy, use and performance **(**Wosu, Charles, & Samuel, 2016)**.** Additionally, very little is known about special education teachers' use of high tech AT to perform teaching tasks in the special school in Nigeria. Therefore, there is the need to conduct an investigative research so as to assess the level of availability, adequacy and utilization of high technologies currently in special education programmes for the physically challenged students in special needs schools in North West Nigeria.

Research Problem

Since the inception of 21st century, individuals increasingly became immersed of technological changes and innovation; yet the situation in classrooms has not change. The problem of students domantness fed by a static pedagogical method is as old as the classroom itself.

However, the emphasis of today's education is student-centred learning which aimed at developing today's learner with problem solving skills, critical thinking ability and other skills necessary for survival beyond the four wall of the classroom. How learners access curriculum is crucial for the attainment of these current educational demands. For students with physical disabilities, access to the curriculum will require the use of assistive technologies. Assistive technology's Success is best evaluated by how it enables an individual with a disability to exercise self-determination and greater independence. The technology we used in education in the past lacked the necessary accessibility features available to guarantee the 21st century survival skills amidst the strong competition from able bodies. Research findings shows that despite the adoption of traditional technologies, still many of the students with disabilities in developing countries like Nigeria were experiencing barriers to their learning. These include difficulties in reading, writing and reception of information. Physically challenged students continue to learn under frustrating conditions. This causes drop out of many physically challenged students from school for street begging. Furthermore, the very few who manage to

graduate from school certainly do so without necessary skills for survival and as such they found it difficult to be absorbed by today's labour market. Additionally, the few that were lucky to be employed on condition of their status find it difficult to perform on the job because they weren't adequately trained using today's technologies. Therefore, providing low technologies is not enough to meeting the needs of people with disabilities effectively. High-Tech assistive options were developed to offer the best way of assist to individuals with disabilities to succeed in the classroom, community, and workplace.

Research in the area of high-tech assistive technology availability and use is relatively narrow due to it being a relatively new phenomenon in education, the scaring price tag of some of these life-changing devices as well as slow nature of developing countries like Nigeria to accepting new innovation. In essence, there are no home-based studies that see the development and use of high-tech assistive technology for teaching and learning of students in special schools, even though, some were reported to existed. It is this gap in research and development that prompt the desire from the researchers to undertake research on the availability, adequacy and use of high-tech assistive technology in special needs schools in North West Nigeria.

Research Questions

The following research questions were raised to guide the study.

(ii) What are the available high-tech assistive technology for teaching and learning of the physically challenged students in special education schools in North West Nigeria?

(ii) How adequate are the available high-tech assistive technology for effective teaching and learning of students with physical disabilities in special education schools in North West Nigeria?

(iii) How often do teachers make use of the available high-tech assistive technology for the teaching of physically challenged students in special education schools in North West Nigeria?

(iv) What are the major factors that are preventing teachers from effective utilization of high-tech assistive devices in teaching the physically challenged students in special education schools in North West Nigeria?

Research Methodology

The research deign adopted for this study is the descriptive survey research method because the designed made it possible for the researchers to have a broad view from a sample of special education teachers in the special education schools in order to draw conclusions regarding availability, adequacy and utilization of high-tech assistive technology.

The population for this study include all teachers of special education schools in North West Nigeria.There are 354 special education teachers spread across seven public special education schools in North West Nigeria.The target population for this study comprised of special education teachers from thecomprehensive special education schools in North West Nigeria. One hundred and twenty (120) special education teachers were sampled from the population through simple random sampling technique from three comprehensive special education schools. The three selected special education schools were Kaduna State Special Education School, Kaduna, Kebbi State Special Needs School, Birnin-kebbi and Special Education School, Tudun Maliki Kano.

Two different instruments were used to collect the required information for the study. The two instruments used were questionnaire and observation checklist. The questionnaire titled "Teachers High-Tech Assistive Technology Utilization Questionnaire (THATUQ)". The questionnaire has two sections: Section A and Section B. Section A sought information in line with the respondents' personal data, including information regarding teaching domain and gender among others. On the other hand, section B sought relevant information needed to address the problem under study. It is structured in Likert Scale pattern with options of Frequently (F) = 5 points, Sometimes (S) = 4, Rarely (R) = 3, Once (O) = 2, and Not at all (N) = 1, respectively. The checklist titled: "High-Tech Assistive Technology Availability in Special Education Schools (HATASES)". The checklist included a list of some of high-tech assistive devices/software needed for the education of individuals with physical disabilities.HATASES has provision for name of school as well as location of the school. Additionally, it has provision for the researcher to assess adequacy of these technologies. The checklist is divided into five sections: Section A,B,C,D&E which consisted of high-tech assistive devices/software for visual impairments, hearing impairments, speech impairments, motor impairments, and multiple impairments, respectively.

The instruments were subjected to expert assessment in order to determine their face and content validity. Three lecturers from the Department of Educational Technology, Federal University of Technology, Minna, and two special education experts from Niger State College of Education, Minna assessed the comprehensiveness, adequacy and clarity of the items. Corrections and suggestions raised by these experts were effected accordingly in the final drafted questionnaires. Thereliability of the instruments used were established through pilot testing with 20 teachers from two special needs schools within the study area, but not part of the sampled schools. The reliability value of 0.81 was obtained for the questionnaire using Cronbach Alpha formula and 0.74 was obtained for the checklist using Cohen's Kappa's inter-rater reliability formula. The data collected was analysed using descriptive statistics such as percentage, mean and standard deviation.

3.0 Results

Table 1: Demographic Distribution of Respondents According to Teaching Areas

Teaching Area	**KSSES**		**KSSNS**		**SESK**	
	F	**%**	**F**	**%**	**F**	**%**
Teachers of Visually Impaired Students (VI)	15	37.5	10	25	12	30
Teachers of Hearing Impaired Students (HI)	16	40	13	32.5	10	25
Teachers of Speech Impaired Students (SI)	-	-	4	10	5	12.5
Teachers of Students with Motor Limitation (ML)	-	-	6	15	5	12.5
Teachers of Students with Multiple Physical Impairment (MPI)	9	22.5	7	17.5	8	20
Total	40	100	40	100	40	100

Table 1 shows the distribution of the respondents according to teaching domains in the three sampled schools. It shows that, out of 40 respondents in Kaduna State Special Education School, 15 (37.5%) are VI teachers, 16 (40%) are HI teachers and 9 (22.5%) are MPI teachers; Kebbi State Special Needs School (KSSNS) has 10 (25%) VI teachers, 13 (32.5%) HI teachers, 4 (10%) SI teachers, 6 (15%) MI teachers and 7 (17.5%) MPI teachers; while Special education School, Tudun Maliki, Kano has 12 (30%) VI teachers, 10 (25%) HI teachers, 5

(12.5%) SI teachers, 5 (12.5%) ML teachers and 8 (20%) MPI teachers. Cumulatively, there are 37 (30.8%) VI teachers, 39 (32.5%) HI teachers, 9 (7.5%) SI teachers, 11 (9.2%) ML teachers and 24 (20%) MPI teachers, respectively.

Research Question 1: What are the available high-tech assistive technology for teaching and learning of the physically challenged students in special education schools in North West Nigeria?

Research Question 2: How adequate are the available high-tech assistive technology for effective teaching and learning of students with physical disabilities in special education schools in North West Nigeria?

Table 2.1: Teachers Response on Availability and Adequacy of High-Tech Assistive Devices and Software for Teaching and Learning of the Visually Impaired Students.

SN	AT Devices / Software	School	Available and Adequate		Available but Not Adequate		Not Available		Decision
			F	%	F	%	F	%	
1	Computer	KSSES	3	20	12	80	-	-	ANA
		KSSNS	1	10	10	90	-	-	ANA
		SESK	-	-	11	91.7	1	8.3	ANA
2	Screen Reader	KSSES	2	13	9	60	4	26.7	ANA
		KSSNS	-	-	10	100	-	-	ANA
		SESK	1	8.3	10	83.4	1	8.3	ANA
3	Optical Character Recognitions	KSSES	5	33.3	8	53.4	2	13.3	ANA
		KSSNS	2	20	6	60	2	20	ANA
		SESK	4	33.4	6	50	2	16.6	ANA
4	Power Braille NoteTaker	KSSES	1	6.7	3	20	11	73.3	NA
		KSSNS	-	-	3	30	7	70	NA
		SESK	2	16.6	4	33.4	6	50	NA
5	Descriptive Video Service	KSSES	-	-	1	6.7	14	93.3	NA
		KSSNS	-	-	2	20	8	80	NA
		SESK	-	-	1	8.3	11	91.7	NA
6	Computer Screen Manification	KSSES	6	40	8	53.3	1	6.7	ANA
		KSSNS	3	30	5	50	2	20	ANA
		SESK	4	33.4	7	58.3	1	8.3	ANA
7	Book Scanner	KSSES	1	6.7	5	33.3	9	60	NA
		KSSNS	2	20	7	70	1	10	ANA
		SESK	3	25	8	66.7	1	8.3	ANA
8	Zoom Text	KSSES	-	-	8	53.3	7	46.7	ANA
		KSSNS	1	10	7	70	2	20	ANA
		SESK	-	-	5	41.7	7	53.8	NA
9	MP3	KSSES	3	20	7	46.7	5	33.3	ANA

		KSSNS	1	10	9	90	-	-	ANA
		SESK	2	16.7	6	50	4	33.3	ANA
10	Reading Pen	KSSES	-	-	1	6.7	14	93.3	NA
		KSSNS	1	10	1	10	8	80	NA
		SESK	-	-	2	16.7	10	83.3	NA

Decision Percentage Score = 50%

From the decision in table 2.1, it can be observed that of all the assistive devices and software presented, none is adequately available as reported by the respondents. The analysed data showed that computer and other software (Screen Reader, Zoom Text, Optical Character Recognition and Magnification software) received higher percentage scores. This showed that they are available. However, they are not adequate. Other assistive devices including Power Braille NoteTaker, Descriptive Video service and Reading pen received below 50% scores, which showed that they are not available. From these results, it can be deduced that most high-tech assistive devices and software necessary for the teaching and learning of students with visual impairments in special education schools were not adequately available.

Table 2.2: Teachers Response on the Availability and Adequacy of High-Tech Assistive Devices and Software for Teaching and Learning of Hearing Impaired Students.

SN	**AT Devices / Software**	**School**	**Available and Adequate**		**Available but Not Adequate**		**Not Available**		**Decision**
			F	**%**	**F**	**%**	**F**	**%**	
1	FM Amplified System	KSSES	3	18.7	5	31.3	8	50	NA
		KSSNS	1	7.7	3	23.1	9	69.2	NA
		SESK	-	-	3	30	7	70	NA
2	Audio Loops	KSSES	1	6.3	-	-	15	93.7	NA
		KSSNS	-	-	2	15.4	11	84.6	NA
		SESK	1	10	1	10	8	80	NA
3	Infrared System	KSSES	-	-	-	-	16	100	NA
		KSSNS	-	-	3	23.1	10	76.9	NA
		SESK	-	-	-	-	10	100	NA
4	Telecommunication Device for the Deaf	KSSES	2	12.5	8	50	6	37.5	ANA
		KSSNS	1	7.7	9	69.2	3	23.1	ANA
		SESK	-	-	2	20	8	80	NA
5	Live Speech Captioning Device	KSSES	-	-	2	12.5	14	87.5	NA
		KSSNS	1	7.7	4	30.8	8	61.5	NA
		SESK	-	-	-	-	10	100	NA
6	Behind the Air Audio Enhancer	KSSES	4	25	11	68.8	1	6.2	ANA
		KSSNS	1	7.7	7	53.9	5	38.4	ANA
		SESK	2	20	6	60	2	20	ANA
7	In the Air Audio Enhancer	KSSES	1	6.3	13	81.2	2	12.5	ANA

		KSSNS	2	15.4	9	69.2	2	15.4	ANA
		SESK	-	-	8	80	2	20	ANA
8	Mobile Phone	KSSES	4	25	9	56.2	3	18.8	ANA
		KSSNS	2	15.4	7	53.8	4	30.8	ANA
		SESK	1	10	8	70	2	20	ANA
9	Sign Language Software	KSSES	1	6.3	9	56.2	6	37.5	ANA
		KSSNS	-	-	10	76.9	3	23.1	ANA
		SESK	-	-	2	20	8	80	NA
10	Captioning Television	KSSES	-	-	3	18.8	13	81.2	NA
		KSSNS	1	7.7	1	7.7	11	84.6	NA
		SESK	-	-	-	-	10	100	NA

Decision Percentage Score = 50%

Table 2.2 showed that out of the 10 high-tech assistive devices/software presented, only three (in and behind the air audio enhancer and mobile phones) representing (30%) unanimously received above fifty percent (50%) rating, indicating they are available. However, they are not adequate. Two of the three special schools representing (71%) had telecommunication device for the deaf and sign language software that is not adequate. The three schools surveyed unanimously reported that they did not have high-tech assistive devices like FM amplified system, audio loops, infrared system, live speech captioning device and captioning television. Therefore, it can be deduced from these results that the schools do not have most of the high-tech assistive devices used in teaching and learning of students with hearing impairments.

Table 2.3: Teachers' Response on the Availability and Adequacy of the High-Tech Assistive Devices and Software for Teaching and Learning of Speech Impaired Students.

SN	AT Devices / Software	School	Available and Adequate		Available but Not Adequate		Not Available		Decision
			F	%	F	%	F	%	
1	Dragon Naturally Speaking	KSSNS	-	-	1	16.7	5	83.3	NA
		SESK	-	-	-	-	5	100	NA
2	Talking Calculator	KSSNS	2	33.3	4	66.7	-	-	ANA
		SESK	1	20	3	60	1	20	ANA
3	Word Selection Device	KSSNS	1	16.7	3	50	2	33.3	ANA
		SESK	-	-	1	20	4	80	NA
4	Speech 4-Good App	KSSNS	-	-	1	16.7	5	83.3	NA
		SESK	-	-	2	40	3	60	NA
5	Computer	KSSNS	1	16.7	3	50	2	33.3	ANA
		SESK	-	-	4	80	1	20	ANA
6	Screen Reader	KSSNS	1	16.7	5	83.3	-	-	ANA
		SESK	1	20	3	60	1	20	ANA
7	Touch Sensitive pad	KSSNS	-	-	1	16.7	5	83.3	NA
		SESK	-	-	-	-	5	100	NA
8	Device Using Picture and Graphics	KSSNS	-	-	-	-	5	100	NA
		SESK	-	-	-	-	6	100	NA
9	Selection Switches	KSSNS	-	-	2	33.3	3	66.7	NA

		SESK	-	-	-	-	5	100	NA
10	Talking Dictionary	KSSNS	-	-	5	83.3	-	-	ANA
		SESK	-	-	4	80	1	20	ANA

Decision Percentage Score = 50%

From Table 2.3, it could be seen that only two schools were used in the analysis. This is because the other school (KSSES) does not enrol students with speech impairments. Therefore, there were neither teachers nor equipment available for the teaching and learning of students with these disabilities. Nevertheless, results in table 4 shows that only talking calculator, screen reader, computer and talking dictionary were available but not adequate in the sampled schools. Other assistive devices and software, which include dragon naturally speaking, word selection device, speech 4-good, touch sensitive pad, device using pictures and graphics and selection switches received rating of below fifty percent (<50%) scores. Therefore, they are not available in the sampled schools. Hence, it can be deduced from these results that the schools do not have most of the high-tech assistive devices used in teaching and learning of students with speech impairments.

Table 2.4: Teachers Response on the Availability and Adequacy of High-Tech Assistive Devices and Software for Teaching and Learning of Students with Mobility Limitation.

SN	AT Devices / Software	School	Available and Adequate		Available but Not Adequate		Not Available		Decision
			F	%	F	%	F	%	
1	Book Scanner	KSSNS	1	14.3	5	71.4	1	14.3	ANA
		SESK	2	25	4	50	2	25	ANA
2	Power Wheelchair	KSSNS	-	-	-	-	7	100	NA
		SESK	1	12.5	1	12.5	6	75	NA
3	Stand Alone Device with Remote Control	KSSNS	1	14.3	-	-	6	85.7	NA
		SESK	1	12.5	2	25	5	62.5	NA
4	Computer	KSSNS	2	28.6	4	57.1	1	14.3	ANA
		SESK	1	12.5	5	62.5	2	25	ANA
5	Mouth Stick	KSSNS	-	-	-	-	7	100	NA
		SESK	-	-	1	12.5	7	87.5	NA
6	Speech Recognition	KSSNS	-	-	4	57.1	3	42.9	ANA
		SESK	1	12.5	5	62.5	2	25	ANA
7	Portable Digital Assistant	KSSNS	1	14.3	-	-	6	85.7	NA
		SESK	-	-	-	-	8	100	NA
8	Mobile Phone	KSSNS	-	-	6	85.7	1	14.3	ANA
		SESK	1	12.5	6	75	1	12.5	ANA
9	Infrared Technology	KSSNS	-	-	4	57.1	3	42.9	ANA
		SESK	-	-	-	-	8	100	NA
10	Internet Service	KSSNS	4	57.1	2	28.6	1	14.3	AA
		SESK	2	25	1	12.5	6	62.5	ANA

Decision Percentage Score = 50%

From Table 2.4, it could be observed that only two schools were used in the analysis. This is because the other school (KSSES) does not enrol students with mobility impairments. Therefore, there were neither teachers nor equipment available for the teaching and learning of students with these disabilities. However, results in table 4 shows that only book scanner, computer, speech recognition software and mobile phones received slightly above (50%) scores which showed that they are not adequately available in the sampled schools. Other assistive devices and services (power wheelchair, standalone device with remote control, mouth stick, portable digital assistant, infrared technology and internet service) constituting (60%) of the high-tech assistive devices for motor impaired, were reported not available with scores of above fifty percent (50%). Therefore, it can be deduced from these results that the schools do not have most of the high-tech assistive devices used in teaching and learning of students with motor impairments.

Table 2.5: Teachers Response on the Availability and Adequacy of the High-Tech Assistive Devices and Software for Teaching and Learning of Students with Multiple Physical Disabilities.

SN	AT Devices / Software	School	Available and Adequate		Available but Not Adequate		Not Available		Decision
			F	%	F	%	F	%	
1	Mouth Control Stick	KSSES	-	-	1	11.1	8	88.9	NA
		KSSNS	-	-	-	-	4	100	NA
		SESK	-	-	2	40	3	60	NA
2	Adaptive Keyboard	KSSES	1	11.1	5	55.6	3	33.3	ANA
		KSSNS	-	-	4	100	-	-	ANA
		SESK	2	40	3	60	-	-	ANA
3	Voice Activation System	KSSES	-	-	2	22.2	7	77.8	NA
		KSSNS	-	-	1	25	3	75	NA
		SESK	-	-	1	20	4	80	NA
4	Computer	KSSES	2	22.2	7	77.8	-	-	ANA
		KSSNS	1	25	2	50	1	25	ANA
		SESK	1	20	4	80	-	-	ANA
5	Portable Writing Device	KSSES	-	-	-	-	9	100	NA
		KSSNS	-	-	1	25	3	75	NA
		SESK	-	-	-	-	5	100	NA
6	Infrared Sensor	KSSES	-	-	-	-	9	100	NA
		KSSNS	-	-	3	75	1	25	ANA
		SESK	-	-	-	-	5	100	NA
7	Portable Digital Assistants	KSSES	-	-	1	11.1	8	88.9	NA
		KSSNS	-	-	1	25	3	75	NA
		SESK	-	-	1	20	4	80	NA
8	Mobile Phone	KSSES	2	22.2	4	44.5	3	33.3	ANA
		KSSNS	-	-	3	75	1	25	ANA
		SESK	2	40	3	60	-	-	ANA
9	Voice Recognition System	KSSES	1	11.1	1	11.1	7	77.8	NA
		KSSNS	-	-	1	25	3	75	NA
		SESK	1	20	1	20	3	60	NA
10	Switches	KSSES	-	-	1	11.1	8	88.9	NA
		KSSNS	-	-	1	25	3	75	NA
		SESK	-	-	-	-	5	100	NA

Decision Percentage Score = 50%

Results in Table 2.5 showed that out of the ten assistive devices and software presented, only computer, mobile phones and adaptive keyboard representing (30%) unanimously received above fifty percent (50%) scores of available but not adequate from the three schools. One of the three sampled schools have infrared sensor available but not adequate. The three schools surveyed unanimously reported that they did not have mouth stick, voice activation system,

portable writing device, voice recognition system, and switches available for teaching and learning of students with multiple physical disabilities. Therefore, it can be deduced from these results that special schools do not have most of the high-tech assistive devices necessary for the teaching and learning of students with multiple Physical impairments.

Research Question 3: How often do you use assistive device(s) or software when teaching physically challenged students in your school?

The extent to which special education teachers make use of high-tech assistive devices and software in teaching students with physical disabilities was analysed based on their utilization of assistive devices/software on the domains of frequently, sometimes, rarely, once, or not at all. The mean and standard deviation of their responses was calculated and shown in table 3 below.

Table 3:Mean and Standard Deviation onthe Use of High-Tech Assistive Devices and Software by Special Education Teachers

SN	Items	School	N	$\bar{X}$	SD	Decision
I	I …… use high-tech assistive device(s) / software to facilitate teaching and learning in the classroom.	KSSES	40	2.3	1.11	Not At All
		KSSNS	40	2.9	1.49	Not At All
		SESK	40	2.9	1.45	Not At All
II	I …… use high-tech assistive device(s) / software to actively engage the physically challenged students in the classroom.	KSSES	40	2.7	1.32	Not At All
		KSSNS	40	2.3	1.31	Not At All
		SESK	40	2.6	1.63	Not At All
III	I …… use high-tech assistive device(s) / software to assess the physically challenged students in the classroom.	KSSES	40	2.6	1.48	Not At All
		KSSNS	40	2.8	1.50	Not At All
		SESK	40	2.9	1.42	Not At All
IV	I …… use high-tech assistive device(s) / software to generate teaching aids for classroom presentation.	KSSES	40	2.7	1.28	Not At All
		KSSNS	40	2.1	1.18	Not At All
		SESK	40	2.7	1.20	Not At All
V	I …… use high-tech assistive device(s) / software to enhance physically challenged students' participation in the classroom.	KSSES	40	2.4	1.22	Not At All
		KSSNS	40	2.5	1.57	Not At All
		SESK	40	2.6	1.53	Not At All
	Grand Mean			**2.6**		**Not At All**

Decision Mean =3.0

Table 3 shows the mean and standard deviation analysis on the extent of special education teachers' use of assistive devices in special education schools. Specifically, item one which states that "I … use assistive devices to facilitate teaching and learning in the classroom" has mean scores of 2.3, 2.9 and 2.9 with standard deviation of 1.11, 1.49, and 1.45, respectively. Similarly, item 2 which states that "I ... use assistive devices to actively engage students with physical disabilities in the classroom" has mean scores of 2.7, 2.3 and 2.6 with standard deviation of 1.32, 1.31 and 1.63, respectively. Item three which states that "I … use assistive devices to assess students with physical disabilities in the classroom" has mean scores of 2.6, 2.8 and 2.9 with standard deviation of 1.48, 1.50 and 1.42, respectively. Also, item four which states that "I … use assistive devices to generate teaching aids for classroom presentation" has mean scores of 2.7, 2.1 and 2.7 with standard deviation of 1.28, 1.18 and 1.20, respectively. Furthermore, item five which states that "I … use high-tech assistive devices to enhance students with physical disabilities participation in the classroom" has mean scores of 2.4, 2.5 and 2.6 with the standard deviation of 1.22, 1.57 and 1.53, respectively. On a general note, it

can be deduced from the results presented in Table 3 that teachers do not make use of high-tech assistive devices and software in teaching students with physical disabilities in special education schools. This is because all the items that measure teachers' level of utilization of assistive devices had mean scores that were below the decision mean score of 3.0.

Research Question 4: What are the factors that prevent you from effective utilization of high-tech assistive devices in teaching the physically challenged students in special needs schools in North West Nigeria?

Table 4: Mean and Standard Deviation onFactors Preventing Special Education Teachers from making Effective Use of High-Tech Assistive Devices and Software in Teaching the Physically Challenged Students

SN	Items	School	N	$\bar{X}$	SD	Decision
I	Inadequacy of assistive devices and software limits their use in the classroom	KSSES	40	3.6	1.19	Agree
		KSSNS	40	3.4	1.37	Agree
		SESK	40	3.4	1.43	Agree
II	Inadequate electricity supply reduces the use of assistive devices and software in the classroom	KSSES	40	3.6	1.24	Agree
		KSSNS	40	3.7	1.32	Agree
		SESK	40	3.3	1.40	Agree
III	Poor classroom setting hinders the use of assistive devices in the classroom	KSSES	40	3.5	1.24	Agree
		KSSNS	40	3.4	1.56	Agree
		SESK	40	3.9	1.08	Agree
IV	Lack of awareness on the existence of assistive devices in schools hinders their use	KSSES	40	3.8	1.34	Agree
		KSSNS	40	4.1	0.92	Agree
		SESK	40	3.9	1.05	Agree
V	Lack of training reduces the use of assistive devices/software in the classroom	KSSES	40	3.5	1.28	Agree
		KSSNS	40	3.7	1.33	Agree
		SESK	40	3.8	1.17	Agree
	Grand Mean			**3.6**		**Agree**

Decision Mean = 3.0

Table 4 shows the mean and standard deviation of special education teachers' response on the factors that hinders their effective use of assistive devices in the classroom. The analysis of the table reveals the mean sores of 3.6, 3.4 and 3.4 with standard deviation of 1.19, 1.37 and 1.43, respectively for item one which states that "inadequacy of assistive devices limits their use in the classroom". Also, item two which states that "inadequate electricity supply reduces the use of assistive devices in the classroom" has mean scores of 3.6, 3.7 and 3.3 with standard deviation of 1.24, 1.32 and 1.40, respectively. Item three which states that "poor classroom setting hinders the use of assistive devices in the classroom has mean scores of 3.5, 3.4 and 3.9 and standard deviation of 1.24, 1.56 and 1.08, respectively. In the same manner, item four which states that "lack of awareness on the existence of assistive devices hinders their use in the classroom" has mean scores of 3.8, 4.1 and 3.9 with standard deviation of 1.34, 0.92, and 1.05, respectively. Furthermore, item five which states that "lack of training reduces the use of assistive devices in the classroom" has mean scores of 3.5, 3.7 and 3.8 with standard deviation of 1.28, 1.33 and 1.17, respectively. Generally, the table reveals the grand mean score of 3.6 which is greater than the decision mean score of 3.0. This implies to a greater extent that the presented significantly hindered special education teachers from effective use of assistive devices in the classroom.

Summary of Major Findings

The summary of major findings from this study includes:

(i) It was discovered that high-tech assistive devices and software necessary for teaching and learning of students with physical disabilities are not largely available in the selected special education schools.
(ii) The available assistive devices and software were not adequate as required for the teaching and learning of students with physical disabilities in the selected schools.
(iii) Special education teachers do not effectively use assistive devices and software in teaching students with physical disabilities in the selected special education schools.
(iv) Factors such as inadequacy of assistive devices, inadequate power supply, classroom setting, lack of training and lack of knowledge on the present of these assistive devices in schools hindered their utilization in special education schools.

Discussion of Findings

This aim of this research is to assess availability, determine adequacy and extent to which special education teachers use high-tech assistive devices and software in teaching students with physical disabilities in special education schools in North West Nigeria. In line with research question one and two, table 2.1, 2.2, 2.3, 2.4, and 2.5 were analysed using percentage. Special education teachers from different teaching domain revealed that assistive devices and software require for teaching and learning of students with physical disabilities were not adequately available in special education schools. This finding might be due to the fact that special education unit like any other education unit in Nigeria is grossly underfunded. This finding is in agreement with the finding of Yusuf and Fakomogbon (2008) who found that due to the scaring price tag of assistive devices for the visually impaired, government have put a halt to the supply of these basic teaching and learning devices for quite some years in the past. The finding is also in consistent with that of Yusuf, Fakomogbon, and Issa (2012) which discovered a gross inadequacy of assistive technologies for special education. Additionally, this finding is in line with the finding of Shikden (2015) which discovered that most of special education schools in North Central Nigeria did not have most of the assistive devices that are required for the education of students with special needs. Schools that had these devices did not have them in sufficient.

The assessment on the extent at which special education teachers used assistive devices available in their school was based on five different items as shown in Table 3. Unfortunately, most special education teachers do not use assistive devices and software at all in teaching students with physical disabilities. This may be due to teachers' lack of awareness of the existence of such devices in their respective schools, and perhaps because of the inadequacy of the device. This finding corroborates with the finding of Maraizu (2014) which maintained that most of special education coordinator surveyed in Enugu state, Nigerian reported that teachers do not use technology to teach because of the insufficient supply of such devices in special education schools. This is indeed alarming considering the significance of technology to special need students learning. However, the finding of this study is not in agreement with finding of Shikden (2015) which concluded that special education teachers used assistive devices regularly in the classroom. On the contrary, this finding agreed with the finding of Onivehu, Ohawuiro, and Oyeniran (2017) which discovered that teachers of students with physical disabilities were not using assistive devices to teach because of their high-tech nature and because they were not adequately available and accessible by teachers.

Another finding that aroused from this study also revealed some major factors that hindered the special education teachers in North West geopolitical zone of Nigeria from effectively using assistive devices available in their respective schools in classroom presentation. The finding revealed problems that include inadequacy of assistive devices, inadequate power supply, poor classroom setting, lack of training and lack of awareness on the present of these assistive devices in schools as major barriers to the effective use of assistive devices by teachers in special education school within the geopolitical zone under study. This finding corroborates with the finding of Coleman (2011) which discovered unused assistive devices sitting on shelves and stored in schools stores while teachers were not aware of their existence in the school. Similarly, the finding agreed with the finding of Shikden (2015) which found out that teachers lack of competency in assistive technology, insufficiency of assistive technologies and lack of regular electricity supply were among the major factors that hindered the effective use of assistive devices in special education schools in North Central Nigeria. The finding is also in line with the finding of AJuwon and Chitiyo (2015) which discovered that lack of training in the use of assistive devices, lack of appropriate assistive devices and services in the classroom and irregular electricity supply as the biggest challenges regarding assistive technology utilization in special education schools in Nigeria. The similarities of these findings may be attributed to the fact that the studies focused on the use of assistive devices by special education teachers who were expected to use assistive technology to facilitate teaching and learning of students with disabilities in special education schools.

Implications of Findings

Based on the findings of this study, the following implications were drawn.

The integration of emerging technologies in teaching and learning has become a global trend. Hence, no country would like to be left out this development because of the enormous benefits attached to it. Consequently upon this, finding of this study shows that most high-tech assistive technologies required for the teaching and learning of students with special needs were not adequately available in special education schools. The implication of this finding is that special education teachers would not be able to effectively integrate these forms of innovationin the teaching and learning process in order to enhance quality special education.

Integration of high-tech assistive technologies in teaching and learning of special education students will help to improve the quality of special education. High-tech assistive devices provide students with special needs the opportunity to acquire necessary skills for 21st century survival. However, it is disheartening to note that majority of special education teachers do not make use of the available high-tech assistive devices and software in the classroom. This implies that teachers lack the skills to implement new innovations in special education. Therefore, even when government and other stakeholders provide high-tech assistive technologies for special education, the hope of quality special education may not be attained because special education teachers do not make use of innovative pedagogies regularly to implement curriculum.

The application of high-tech assistive technologies is paramount to providing quality special education. Unfortunately certain factors such as poor electricity supply, traditional classroom setting, lack of training and inadequacy of these technologies among others pauses barriers which prevent it from becoming a reality. By implication, quality special education in Nigeria can only be achieved when such barriers identified by teachers are adequately addressed.

Conclusion

Based on the findings from the analysis of the data collected for this study, the researchers concludes that high-tech assistive devices and software that are required for the effective teaching and learning of students with physical disabilities in special education schools across North West Nigeria ware not largely available. Only few assistive devices and software ware found available in special education schools, however they were not adequate. This inadequacy of assistive devices necessary for teaching and learning of students with special needs can be attributes to poor funding of special education and lack of regular supply of assistive technology by the government. The study also concluded that the few assistive devices available in special education schools were found not in good condition. The poor state of assistive technology in special education schools can be attributed to fact that some of these devices and software are over stretched and some might have faced the taste of time and because they are not properly kept, they developed faults and malfunction.

In terms of use, the study discovered that special education teachers do not use high-tech assistive devices available in teaching students with physical disabilities in special education schools. The unused can be attributed to inadequacy of the available assistive devices and software, lack of awareness on the existing assistive devices in schools, irregular power supply and inability to operate high-tech assistive devices.

Recommendations

Based on the findings of this study, the following recommendations were given.

(i) Both the federal and state governments should improve on funding special education technologies so as to ensure that the necessary assistive devices are made available in a required quantity in special education schools.

(ii) Government and other stakeholders should organize workshop, seminars and other capacity building training regularly for teachers as means of updating their knowledge and skills in the use of emerging assistive devices considering the dynamic nature of special education technology.

(iii) Government, school administrators and other stakeholders in special education should work towards improving power supply, upgrading classrooms to a standard that will guarantee assistive technology utilization and creating awareness regarding assistive technologies available in special education schools. This will help to curb the problem of abandonment and underuse of assistive technologies in special education schools.

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IMPLIMENTING PROBLEM- BASED LEARNING PEDAGOGIES AS A MEANS FOR IMPROVING QUALITY IN MATHEMATICS EDUCATION

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Abstract
The paper argued that students in the 21st century need to possess some fundament skills to become global leaders and valuable citizens in this era of unprecedented breakthroughs in technology and constant change in many aspects of life. These skills include that of curiosity, critical thinking, creativity and innovation. Studies have shown that the traditional teaching methods have failed to develop these skills. Other studies however, showed that students can acquire these skills in a student–centered learning environment. Problem-based learning (PBL) strategy which is one of the student–centered pedagogy has been shown to be effective in developing students' critical thinking and problem solving skills. The paper then report the results of the efficacy of (PBL) strategy on gender and achievement of senior secondary school (SSS I) students in algebra in Chanchaga local government area of Niger state.The study adopted quasi-experimental design, used 161(91 males and 70 females) students from two schools. The experimental period lasted for four weeks the control group was taught using lecture method while the experimental group was taught using (PBL) strategy. Two research questions were answered and their corresponding research hypotheses were tested at $p \leq 0.05$. There was a significant difference between the post-test mean scores of the experimental and control groups in favour of the experimental group. It was recommended among others that teachers should use (PBL) strategy in teaching mathematics. Methodology courses in the pre-service and in-service training of mathematics teachers should include instruction on (PBL) strategy.

Keywords: Problem-based learning. Innovation. 21st century skills. learner-centered. Technology

Introduction
More than ever before, students in 21st century will apply what they learn in school to professional careers and solve problem that are yet to exist. To become global leaders and valuable citizens of today and tomorrow and to have a broad understanding of the world, students must learn to be independent critical thinkers. Similarly, they must be able to: demonstrate deep conceptual understanding of their chosen discipline, approach challenges with curiosity, critical thinking and creativity, innovatively apply their skills to tackled complex real-world problems and developed as independent learners with high self-efficacy (Aligbe, Chionson & Azuka, 2016; Zhang, 2016). For the Nigeria education system to be qualitative it must be capable of delivering students that are able to be innovative at the workplace. Since innovation is often related to new and improved products, high-quality education of scientists and engineers is often regarded as crucial.

Mathematics is seen as an ingredient for the effective articulation of the abstract elements of science that gives impetus to the development of technologies. Mathematics is incorporated into

the language of physical sciences and technology. One of the key synergy of mathematics with technology is as technology advances it inevitably influences what happens in the mathematics classroom. Similarly, when demand for skill types changes in the labour market, the education sector should respond correspondingly to ensure high employability and innovation in the economy. So also, when production becomes more advanced and complex, the educational sector must respond by adjusting the content, the curricula, the teaching methods and the learning environments (Torberg & Mang, 2015).

Research studies have shown that the traditional teaching methods have failed to developed these required skills (Sunday, Akanmu, & Fajemidagba, 2016;Hamza & Mohammed, 2018). Azuka, Durajaiye, Okwuoza and Jekayinfa (2013) advocated for new methods of teaching mathematics that will be learner-centered and activity based. These teaching and learning of mathematics methods should emphasize student-centered approach that requires them to construct their own knowledge and ability to think mathematically in school. One of the student-centered learning approaches that is widely in use is problem-based learning (PBL) approach (Gabriel, Mihaela, Sorin, Petrescub & Gorghiud, 2015; Ajai, & Imoko, 2015). The problem based learning (PBL) is a student-centered pedagogy. It is described as a constructivist teaching model based on the assumption that learning is a product of cognitive and social interactions originating from a problem focused environment. In PBL approach students develop critical thinking and problem-solving skills in addition to developing strategies of grasping essential concepts through the analysis of real-life problems.

Steps involve in Problem -Based Learning

Review of studies of Aweke, Beyene, Beyene and Shiferaw (2017) and Merritt, Lee, Rillero, and Kinach (2017) showed that PBL involves four basic stages: problem analysis, self-directed learning, brainstorming and solution testing.

Advantages of Problem Based Learning

Students improve their problem-solving skills in the process of problem-basedlearning as they resolve given problem cases by themselves. Consequently, acquisition of such skills will assist them in solving problems thatthey encounter throughout their lives. Thus, it could be possible to raise individuals who can resolve the problems they encounter through inquiry, research, and cooperation.

PBL creates an environment in which students actively participate in the learning process, take responsibility for their own learning, and become better learners in terms of time management skills. PBL appears to improve critical thinking, communication, mutual respect, teamwork, and interpersonal skills and increase students' interest in the course or subject (Aweke, Beyene, Beyene,&Shiferaw,2017). Results from other studies suggested that PBL encourages students to identify knowledge deficiencies, coordinate actions and people, realize goals, and continuously monitor understanding (Mustaffa, Ismail, Z, Tasir& Mohamad,2016; Zakariya, Ibrahim, & Adisa, 2016).

Purpose of the Study

The purpose of this study is to determine the efficacy of problem based learning strategy on gender and academic achievement of senior secondary school (SSI) students in algebra. Specifically, the study sought to:

(i) Determine the difference in the mean achievement scores between students taught algebra with problem based learning strategy and those taught using lecture method.
(ii) Find out gender differences in performance of(SSI)students taught algebra using problem based learning strategy.

Research Question

The following are the research questions that guided the study:
(i) Will there be any difference in the mean achievement of students taught using problem base learning strategy and those taught using lecture method?
(ii) Would there be any gender differences in performance of (SSI) students taught algebra using problem-based learning strategy?

Research Hypothesis

The following hypothesis were formulated and tested at $P<0.05$:
$H0_1$:There is no significant difference in the mean achievement of students taught using problem base learning strategy and those taught using lecture method.
$H0_2$:There is no significant gender difference in performance of (SSI) students taught algebra using problem-based learning strategy.

Research Design

This study adopted the quasi-experimental design. The pre-test and post-test non-equivalent control group was used. This study considered it suitable because intact classes were assigned to experimental and control groups to determine the effect of PBL on students' achievement in mathematics.

Figure 1:Research Design Illustration

Groups	Pre-Test		Post-Test
(E)	→	$Y_1 X_1 Y_2$ →	→
(C)	→	$Y_3 X_0$ →	→ Y_4

(E) = Experimental group; (C) = Control group; X_1 = Problem Based Learning Method
X_0 = Lecture Method

Population of the Study

The population of the study consists of all public senior secondary schools class of (SS 1) students in Chanchaga Local Government Area of Niger State.

Sample and Sampling Techniques

The Multistage sampling procedure was adopted. In the first stage,In the first stage, purposive non-probability sampling was used to select all the co-educational schools in Chanchaga Local Government Area of Niger State. In the second stage a random sample of two schools was made using a table of random numbers. In the third stage one school was randomly assign to experimental group, while the other as control group using flipping of coin.

Table 1 Sample Selected for the Study

S/NO	NAME OF SCHOOLS	MALE	FEMALE	TOTAL
1	Limawa Model School Kpakungu, Minna	48	36	84
2	Day Secondary School Tunga, Minna	43	34	77
	Total	**91**	**70**	**161**

Instrumentation

The instruments for the data collection for the study were algebra achievement test (AAT) and lesson format for experimental and control group.The algebra achievement test (SAAT) was used to measure students' performance in algebra. This consisted of five theory questions which were drawn from West African Examination Council (WAEC), National Examination Council (NECO) and general mathematics textbook.

Instructional procedure

Treatment session for the experimental group wasdone by trained research assistantwith the aid of lesson plans prepared by the researchers and lesson conducted under supervision of the researchers. The lesson for the experimental group was presented using the PBL four basic stages of: problem analysis, self-directed learning, brainstorming and solution testing.

Problem analysis

At this stage students were presented with an authentic problem to be solved. The problem may be from an industry or business scenario based on real world events. During this period, teams of four to six students collaborate to analyze and frame the problem. This process involves dissecting the problem to identify and have clear understanding of the problem, what is known, what is unknown, what are situational constraints. They then develop an action plan.

Self-directed learning

Self-directed learning involves setting specific learning goals, identifying the necessary resources (including human resources) to solve the problem, monitoring comprehension of the requisite knowledge and skills being acquired and evaluating the extent to which the newly acquired knowledge and skills apply in solving the problem at hand.

Brainstorming

During the brainstorming stage, students meet to discuss what they have learned in the self-directed learning phase in hopes of converging on a possible solution to the problem. Individual contributions are presented without criticism or judgment. By expressing ideas and listening to what others say, students can gauge their own level of knowledge, absorb new information, increase their levels of understanding and awareness, and converge on a solution that represents the collective knowledge of the group.

Solution testing

The final stage in the problem solving process is solution testing. Once a tentative solution has been agreed upon by the group, it must be evaluated to determine if it satisfies the desired outcome criteria established in the problem analysis phase. If the solution satisfies the desired outcome criteria and benchmarks, a formal presentation of the solution is presented in which peer review is used to validate the problem solution. If the problem solution does not meet the

desired outcome criteria or performance benchmarks, the problem-solving process are repeated until an acceptable solution is reached.

Findings

HO_1: There is no significant difference in the performance of SSSI students taught algebra using PBL approach and those taught using lecture method. To test this hypothesis the post-test scores of the subjects in the experimental and control groups were compared using t-test statistics. Table 2 showed the result obtained

Table 2: Summary of t-test for Post-test of Experimental and Control Groups

Groups	No of std	Df	Mean (x)	SD	t- cal	t- crit	p
Experimental	84		61.24	15.86			
		159			12.46*	1.96	0.05
Control	77		32.16	9.47			

From Table 2 the value of t-calculated of 12.46 was found to be higher than t-critical of 1.96 further confirms the result. The null hypothesis was thus rejected. This means that there was significant difference between the performance of the experimental and the control groups in favour of the experimental group.

HO_2: There is no significant difference on gender performance of SSSI students taught algebra using (PBL). To test the hypothesis the post-test scores of male and female subjects in the experimental group were compared using t-test statistics.

Table 3: Table 3: Comparison of Mean Performance Scores of Male and Female SSSI Students in Experimental Group

Groups	No of std	Df	Mean (x)	SD	t- cal	t- crit	P
Male	48		62.93	12.64561			
		82			1.068**	1.96	0.05
Female	36		60.11	12.55610			

From table 3, the value of t-calculated of 1.068 which is found to be less than t- critical of 1.96. The null hypothesis was thus accepted. This means that there is no significant difference between the performance of male and female subjects of the experimental group.

Discussion

The result from statistical analysis relating to hypothesis one as shown in Table 2 revealed that the experimental group that was exposed to PBL perform better than the control group that was exposed to lecture method. The finding of this study agreed with the of study Ali, Hukamdad, Akhter and Khan (2010) who found that students taught through problem based learning achieved better than those taught by traditional method.

Table 3 results revealed that there was no significant difference in the mean performance scores of male and females ubjects in the experimental group. This indicates that metacognitive strategy is gender friendly. This finding is in agreement with the finding of Olabisi & Emmanue

(2015) whose study showed that there is no significant interaction effect of treatment and gender on grade 9 students' academic achievement in algebra thereby suggesting that gender does determine grade 9 students' academic achievement in algebra.

Conclusion

Based on the findings from the study, it can be concluded that, the use of Problem Based Learning in the mathematics classroom can enhance the quality of mathematics teaching and learning in Nigeria. So also students with critical thinking, curiosity and problem solving skills can be nurtured.

Recommendations

From the findings of the current study and analysis of related studies of which most of them verify the role of PBL in the academic progress, the following recommendations are made:

Teachers should incorporate the use of PBL the use of PBL in their teaching. Teachers of mathematics should use student-centered approaches to improve the academic achievements of the students. Extensive training program, seminars and workshops should be organized by professionals bodies for mathematics teachers in use of student-centered approaches in the classrooms.

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IMPACT OF LABORATORY TECHNIQUE ENRICHED WITH SAFETY TRAINING ON PERFORMANCE AND ATTITUDE TOWARDS PRACTICAL BIOLOGY AMONG NCE STUDENTS IN KATSINA, NIGERIA.

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Abstract
The study investigated impact of Laboratory Technique enriched with safety training on performance and attitude towards Practical Biology among N.C.E students in Katsina State, Nigeria. The study developed three Research Objectives among which include to determine the difference in the academic performance between students exposed to laboratory technique enriched with safety training and those not exposed. The study was guided by three research questions and three null hypotheses A quasi-experimental design using pretest and posttest for both experimental and control groups was used in the study. The population consists of 357 students, 213 males and 114 females respectively. A sample of 100 N.C.E 3 biology students were randomly selected and were further divided as experimental and control groups. The instruments used were Laboratory Safety Technique Performance Test (LSTPT) and Biology Practical Attitude Test (BPAT). At the end of the treatment data were collected and analyzed using t-test, Mann U Whitney and Wilcoxon statistics. The results obtained showed that; (a) significant difference exists in the performance of students exposed to laboratory technique enriched with safety training and those not so exposed. (b) There is no significant difference in the attitude of male and female students exposed to laboratory Technique enriched with safety training. From the findings recommendations were made one of which: the use of laboratory Technique enriched with safety training should be encouraged among biology teachers by organizing seminars, workshops and talk shows on the importance of safety measures in the laboratories.

Introduction
Science can be defined as the systematic enterprise that builds and organizes knowledge in the form of test-able explanations and prediction about nature and universe. This knowledge is determined through the scientific method by experiments and observations, and may take the form of scientific facts, scientific models or scientific theories (Science online Etymology Dictionary 2014). Other scholars defined science as a human activity that leads to the production of a body of universal statements called laws, theories or hypotheses which serves to explain the observable behaviors of the universe or some aspects of the universe (Shaibu, 2008). According to Usman (2008), science is a method or process which requires observations and problem solving, it is not dogmatic and has special characteristics that its tenets are universal and capable of production under same conditions.

Since science is a process requiring interaction with materials to stimulate internal conceptions, the Federal Government of Nigeria in the National Policy on Education (FRN, 2013) de-emphasized the memorization and regurgitation of facts but instead emphasized practical, exploration and experimentation methods of teaching otherwise known as hands-on which can lead to sustainable development of the students (Isa, 2007). National Association of Biology Teachers (NABT 2005) Define laboratory as a place where students use process and materials

of science to construct their own explanation of biological phenomena. They observe, collect data and interpret data of life process, living organisms and simulations of living phenomena. These activities in biology provide opportunities for students to actually do science as opposed to learning about science. Nzewi (2008) asserted that laboratory activities can be regarded as a strategy that could be adopted to make the task of a teacher (teaching) more real to the students as opposed to abstract or theoretical presentation of facts, principles and concepts of subject matters. However, laboratories are endowed with hazards which can lead to the occurrence of accidents and jeopardize the safety of all its users especially students.

Laboratory safety training can be seen as the activity or process of teaching and learning or imparting and acquiring of skills, techniques or abilities of preventing harm, accident, injury and hazard in the laboratory. It also provides guidelines for students when developing safety ways to carry out practical works. This will enable practical work, a necessary part of the overall education in experimental biology, to be carried out more safely in school laboratories. Consequently, students must acquire the necessary skills to carry out such work in safety and with confidence (Roinn 2007). Therefore, the study intends to investigate if laboratory technique enriched with safety training has effect on academic performance and attitude towards practical biology among colleges of education students in Katsina state Nigeria.

Statement of the Problem

The problem mostly encountered in science laboratory occurs from improper instruction and lack of knowledge concerning the reagents, glasses and other equipment's used by science students in the laboratory. Most of the studies carried out on laboratory management showed that fatal accidents occurred as a result of ignorance (lack of knowledge) of hazards and safety measures associated with the materials and equipment's (Adigun ,1999). Atadoga and Onaolopo (2008) also stated that many times carelessness on the part of the teacher or students have led to fire outbreak and other types of hazards in the school laboratory. In spite of the rules and regulations displayed in many schools, science laboratories accidents still occur (Ado &Olorukooba 2009). Therefore, the importance of laboratory safety technique cannot be overemphasized as science laboratories need to be safe places to work for effective teaching and learning of science.

On the issue of attitude of students toward practical biology Abraham (2005) made the strong claim that many students did not like practical work in any objective sense but merely preferred it to other methods of teaching and that when given a chance to opt out of science many would do so despite having claimed to really enjoy doing practical work. SCORE (2008) explained that whilst students' attitudes to practical work in science were seen positively, the evidence is currently "equivocal" and therefore this area would be benefited from further research. Therefore, this study sought to investigate students' attitudes to biology practical as well as the impact of laboratory technique enriched with safety training on academic performance among science students in Katsina states.

Objectives of the Study

The research has the following objectives, to:

(i) Determine the difference in the academic performance between biology students exposed to laboratory technique enriched with safety training and those not exposed.

(ii) Investigate the difference in academic performance of male and female students exposed to laboratory technique enriched with safety training.

(iii) Investigate the difference in attitude of male and female Biology students exposed to laboratory safety training.

Research Questions

This study sought to answer the following research questions:

(i) What is the difference in the academic performance between biology students exposed to laboratory safety training and those not exposed?

(ii) What is the difference in the academic performance scores between male and female students exposed to laboratory Technique enriched with safety training?

(iii) What is the difference in the attitude of male and female Biology students exposed to laboratory Technique enriched with safety training?

Null Hypotheses

Based on the research questions stated the following null hypotheses are formulated for testing $P \leq 0.05$.

$H0_1$: There is no significant difference between the academic performance of biology students exposed to laboratory Technique enriched with safety training and those not exposed.

$H0_2$: There is no significant difference in the academic performance scores between male and female biology students exposed to laboratory Technique enriched with safety training.

$H0_3$: There is no significant difference in the attitudes of male and female Biology students exposed to laboratory Technique enriched with safety training.

Significance of the Study

The findings of the research will hopefully be useful to teachers, students, curriculum planners WAEC/NECO Professional bodies and other researchers in similar field in the following ways:

The outcome of the study will:

(i) **Biology Students**; enable students to be aware of the hazards in the science laboratory and the safety measures required to prevent them.

(ii) **Biology Teachers;** enable teachers to be aware of laboratory Technique enriched with safety training to ensure the safety of both human and materials resources in the laboratory.

(iii) **Curriculum Planners;** help the curriculum planners to infuse and emphasize on the importance of laboratory safety in the secondary school science curriculum, so as to prevent laboratory accidents and hazards.

(iv) **Professional Bodies;** help professional bodies such as Science Teacher Association of Nigeria (STAN) to organize conferences and workshop to teach science teachers on how to incorporate activities based lesson in the teaching of science subjects.

(v) **Examination Bodies;** help examination bodies such as WAEC, NECO and NABTEB to assess the level of laboratory safety awareness of students which would be considered when providing practical specimens.

(vi) **Researchers;** The research findings will hopefully be of assistance to fellow researchers in similar area of study and other science subjects to adopt or adapt it for their own studies and come up with additional knowledge by improving on the existing literature.

Scope of the Study

The study is delimited to biology students in Colleges of Education in Katsina state. The laboratory under study is Biology Laboratory and NCE 3 students would be used. The choice of the final year is based on the fact that laboratory design and management is a compulsory course in the final year and it has already been done in the class. The instrument to be used is Laboratory Safety Technique Performance Test (LSTPT) as well as Biology Practical Attitude test (BPAT) which is a questionnaire regarding students' attitude towards practical biology.

Basic Assumptions

For the purpose of this study, the following assumptions were made:

(i) The schools sampled have laboratory facilities

(ii) The schools have qualified science teachers who are expected to be knowledgeable in the laboratory safety measures and make appropriate use of them.

(iii) The subjects of the study have had lessons on laboratory organization and management.

Research Design

The design adopted for the study is quasi experimental design, using pre-test, post-test experimental and control groups. The experimental group was exposed to laboratory safety training before the commencement of Laboratory Safety Technique Performance Test (LSTPT) as well as Biology Practical Attitude Test (BPAT) while the control group was denied. After the administration of the instrument the result of the two groups were compared to determine the impact of laboratory safety training on students' academic performance. The design of the study is presented in Figure1;

EG → O1 (PT, AT) → X1 → O2 (PT,AT)

CG → O1 (PT, AT) → X0 → O2 (PT, AT)

Figure 1: Research Design

EG	-	Experimental Group	CG	-	Control Group
X1	-	Treatment	X2	-	No Treatment
PT	-	Performance Test			Attitude Test
O1	-	Pretest	O2	-	Posttes

Population of the Study

The concept population refers to the entire set of subjects or the phenomena about which data are to be generated (Okoye 2012). Therefore the population of the study comprised all the NCE 3Biology students in the Colleges of Education in Katsina state. There are two colleges of education which include Federal College of Education Katsina located in Katsina metropolis and the state owned college of education which is Isa Kaita College of Education located in Dutsinma local government area. The total population of these students is 357, of which 213 are males and 114 females, details of the population are shown in Table 1;

Table 1: Population of the Study

Course combination	Males	Females	Total
Federal college of Education Katsina			
Biology/Computer	89	55	144
Biology/ Integrated Science	50	49	99
Isa Kaita College of Education Dutsinma			
Biology /Mathematics	11	1	12
Bilogy /Geography	63	09	72
Total	213	144	357

Source: F.C.E Katsinsa and I.K.C.E Dutsinma

Sample and Sampling Technique

For the purpose of this study the two colleges of education are used as sample where school A was the experimental group and school B was used as control group. Simple random sampling of balloting method was used to obtain the number of students. Thus, a total number of 100students comprising of 26male and 74 female students with average age of 22 were used as sample. Both Expreimental and Control groups are made up of 50 sample size each. This is in line with Kerlinger, (1973), and Central Limit theorem which recommends minimum of 30 subjects as sample size in a research of this nature (Tuckman 1975). The schools were selected as experimental and control groups respectively using balloting system (the first to be picked was tagged experimental while the second was tagged control). Details of the sample are shown in Table 2.

Table 2: Sample of the Study.

Schools	Male	Female	Total
School A	34	16	50
School B	40	10	50
Total	74	26	**100**

Instrumentation

For the purpose of this research, two research instruments were constructed which are Laboratory Safety Technique Performance Test (LSTPT) to determine the impact of laboratory technique on academic performance of students adapted from Ado (2004) and Biology Practical Attitude Test (BPAT) which is a questionnaire regarding students attitude towards practical biology adopted from Sharpe (2012).

The LSTPT contains 2 sections A and B, section A is made up of 30 multiple choice objective test items each with four alternative (A-D) from which the students will select the correct answers, and B has 10 questions on laboratory safety signs. These questions are designed with the aim of assessing students' ability and skills in the following areas of laboratory activities;

(i) General laboratory rule regulations and management
(ii) Hazard and safety precautions
(iii) First aid\ and hygiene

(iv) Useful practical technique and handling of materials
(v) Safety signs in the laboratory.

The table of specification for Laboratory Safety Technique Performance Test based on Blooms Taxonomy (1956) but developed by the researcher (2016) and is presented in Table 3.3
The questionnaire regarding students' attitudes towards practical biology contains two sections, Section A contains personal information and Section B contains 20 questions on positive and negative attitudes of students to practical biology. A Likert scale with four point system was used to measure the responses on this instrument.

Validation of the Instrument
Validation refers to the degree to which an instrument measures what it's supposed to be measuring (Akuezuilo&Agu 2003). The instrument was validated by experts who are PhD holders' with minimum rank of senior lecturer in the Department of Science Education, Ahmadu Bello University Zaria. This is in line with Sambo (2008) who maintained that the best procedure for validating research instrument is to give to a panel of experts.

The experts' response to the instruments questions, and corrections and recommendations were made and effected on the basis of content and construct validity of the instrument to produce a new draft of the items.

Reliability of the Instrument
To test the reliability of this instrument, pilot test was conducted using test-retest reliability at interval of two weeks at School C in line with Tuckman (1975) and Sambo (2008) that sample size of minimum of 30 subjects is viable for experimental study of this nature and central limit theory which recommended (N>30) sample size as noted by Sambo (2008) recommendation of two weeks' interval for test and retest procedure. Pearson Product Moment Correlation Coefficient (PPMC) statistics was used to analyze the reliability of the instrument. Based on the data obtained from the pilot study of the instrument, the reliability was found to be r=0.75, the instrument is reliable and was used for the study.

Presentation of Results
The following null hypotheses were formulated for testing, at 0.05 level of significance. The hypotheses were analysed using independent t-test and Mann Whitney.

Hypothesis One
There is no significant difference between the practical performance of Biology students exposed to laboratory Technique enriched with safety training and those not exposed.
To test $H0_{1,}$ post –test scores of the Experimental and Control groups were subjected to t-test statistics. The summary of the analysis is shown in Table 3.

Table 3: Summary of t-test Analysis of Post-test Scores of Experimental and Control Groups.

Variable	Groups	N	Mean	Std.dev	Std.Err	Df	P
performance mean scores	Experimental	50	52.70	15.01	2.12	98	0.03
	Control	50	46.45	13.69	1.94		

Calculated p ≤ 0.05

From the results in Table 3, it was observed that t-value of 2.18 was calculated and the p-value of 0.03 was observed at the degree of freedom of 98. The critical p value of 0.03 is less than the p- value of p 0.05. This shows that significant differences exist between the practical performance of students exposed to laboratory Technique enriched with safety training and those not exposed. Therefore the null hypothesis which state that there is no significant difference between the practical performance of Biology students exposed to laboratory Technique enriched with safety training and those not exposed, is hereby rejected.

Hypothesis Two

There is no significant differences in the academic performance scores between male and female biology students exposed to laboratory Technique enriched with safety training**.** To test $H0_2$, post-test scores of the experimental group were subjected t-test statistics. The summary of the analysis is shown in Table 4.

Table 4: Summary of t-test Analysis of Post-test Sores of Male and Female Students

Variable	N	Mean	Std.dev	Std.Err	Df	P
Male	34	54.68	14.41	2.47		
Female					48	0.18
	16	48.50	15.84	3.96		

Calculated p ≤ 0.05

From the results in Table 4, it reveals that, the t-value observed is 1.38 and the p-value of 0.18 at degree of freedom of 48. It is seen that the p-value calculated of 0.18 is greater than the p-value critical of 0.05 which means there is no significant difference in the academic performance score of male and female students exposed to laboratory Technique enriched with safety training. This implies that the use of laboratory Technique enriched with safety training is effective for both male and female students performance. Therefore the null hypothesis which state that there is no significant differences in the academic performance scores

between male and female biology students exposed to laboratory Technique enriched with safety training, is hereby accepted and retain

Hypothesis Three
There is no significant difference in the attitude of male and female Biology students exposed to laboratory Technique enriched with safety training.

To test $H0_3$, post-test scores from the experimental group were subjected to Mann Whitney statistics. The summary of the analysis are shown in Table 5

Table 5: Summary of Man Whitney Non Parametric Tests Difference in the Attitude of Male and Female Biology Students Exposed Laboratory Technique enriched with safety training

				Z	Mann-Whitney U	P (sig)
Gender	N	Mean Rank	Sum of Ranks			
Male	34	25.13	854.50	0.26	259.50	0.80
Female	16	26.28	720.50			
Total	50					

Calculated p ≤ 0.05

Results in Table 5 shows that the calculated p value of 0.80 is higher than the 0.05 alpha level of significance. Their computed Mean Rank attitude scores were 25.13 and 26.28 by Male and female students exposed to laboratory Technique enriched with safety training and their computed sum of Rank scores are 854.50 and 720.50 by Male and female respectively. This implies that the safety training experiment produces the same level of positive attitude within male and female Biology students. Thus, the null hypothesis which says there is no significant difference in the attitude of Male and female Biology students exposed to laboratory Technique enriched with safety training, is hereby accepted and retained.

Discussion of Results

The objective of this study was to investigate the Impact of Laboratory Technique enriched with safety training on Academic Performance and Attitude towards Practical Biology among NC E Students in Katsina State, Nigeria. To achieve this aim, students in experimental group were exposed to Laboratory Technique enriched with safety training while students in control group were denied. Four research questions were answered and four null hypotheses were tested. Before the commencement of the treatment, it was established that the subject had equivalent knowledge of Laboratory Technique enriched with safety training through the pre-test. Therefore, the observed differences in the result were due to treatment. The result of the analysis of the data on the research questions and null hypotheses are hereby discussed.

The research question 1 was answered by testing corresponding hypothesis one which state that there is no significant difference between the practical performance of biology students exposed to laboratory Technique enriched with safety training and those not exposed.

The result of analysis presented in Table 3 showed that students in the experimental group who are taught Laboratory safety Training performed significantly better and achieved higher than the control group. In other words it implies that significant positive effect exist as a result of exposing students to laboratory Technique enriched with safety training. This finding is in line with the work of Dewey (1938) who examined the effect of laboratory use on students' achievement in general science as compared to lecture method of instruction; his result revealed that experimental group outperformed the control group in all achievement area.

On the issue of gender in relation to academic performance when exposed to laboratory Technique enriched with safety training, the result is presented in Tables 4 in which the null hypothesis which says there is no significant differences in the academic performance scores between male and female biology students exposed to laboratory safety training is retained and accepted, this agreed with the finding of Hassan and Okatahi (2006) that when male and female were exposed to the same study skill training techniques, such training session will usually have effect on subsequent examination grade of the subjects irrespective of gender. The explanation on this could be that since both students are given equal opportunities to participate actively in the learning process by interacting among themselves and the teacher in Laboratory safety Training.

The process could have helped to improve the student's achievement irrespective of gender.
Research question three was answered by testing the corresponding hypothesis three; There is no significant difference in the attitudes of Male and female Biology students exposed to laboratory Technique enriched with safety training. The result of the analysis in Tables 5 shows that the difference between male and female students is however not significant which implies that Laboratory Technique enriched with safety training produces the same level of positive attitude within male and female Biology students. This is in line with the research of Jacob (2000) which agrees that the difference was found not to be significant and so should probably be ignored, meaning that gender is not important factor in determining students' attitude towards Biology practical in senior secondary schools.

Summary of the Major Findings

The followings are the summary of the major findings of the study:

(i) There is significant difference between the practical performance of Biology students exposed to laboratory Technique enriched with safety training and those not exposed. Their computed performance mean scores are 52.70 and 46.45 by students exposed to laboratory Technique enriched with safety training and those denied respectively with a mean difference of 6.25 in favor of those exposed. This implies that positive effect exist as a result of exposure to laboratory Technique enriched with safety training.

(ii) There is no significant differences in the academic performance scores between male and female biology students exposed to laboratory Technique enriched with safety training.

(iii) There is no significant difference in the attitude of Male and female Biology students exposed to laboratory Technique enriched with safety training.

Conclusion

Based on this study, the following conclusions were made:

(i) Exposure to Laboratory Technique enriched with safety training enhances the practical performance of biology students at NCE level.
(ii) It enhances students' academic performance equally in spite of gender difference
(iii) Laboratory Technique enriched with safety training produces the same level of positive attitude within male and female students.

Finally, because laboratory technique enriched with safety training was practically oriented it has viability of enhancing students' practical performance since the students are more involved in practical activities rather than mare demonstration technique.

Recommendations

The followings are the recommendations put forward as a result of the outcome of the study:

(i) The use of laboratory Technique enriched with safety training should be encouraged among biology teachers by organizing seminars, workshops and talk shows on the importance of safety measures in the laboratories.
(ii) Teachers and students should be well educated in the hazardous nature of each procedure and equipment used during practical lessons
(iii) The signs on the labels of the chemicals should be read, understood and compiled with by the teachers and students in order to prevent hazards in the laboratory

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EFFECTS OF TEAM TEACHING ON SENIOR SCHOOL STUDENTS ACHIEVEMENT IN ADAPTATION IN ILORIN,NIGERIA

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Abstract
The study analysed the effects of Team Teaching on Senior School Students Achievement in Adaptation. A 20 item multiple- choice questions entitled Adaptation Achievement Test (AAT) was validated and distributed to 99 students that participated in the study. The equivalent of the groups was determined before the commencement of the study through pretest administration. A quasi experimental design was adopted, hypothesis one and two were tested using paired sample t-test while three was tested using ANCOVA. The result shows that there was no statistically significance difference in the achievement of students in adaptation when exposed to team teaching. The study also discovered a non-statistically significance difference in the achievement of male and female; and in the achievement of low, medium and high scoring student when exposed to team teaching method.

Introduction

Developing Country like Nigeria requires the knowledge of Science and Technology to driven its economy to greater heights. This is one of the reasons why the Federal Government of Nigeria usually allocates larger percentage of funds to Science and Technology at the tertiary levels. This motive is to set-up to ensure a better economy for Nigerians. Whether or not the goal will be achieve depends on the turnout capacity of secondary education.

Secondary education is a transition stage to tertiary level is being faced with falling standard of education. This is often reflected by poor performance of students in external examination, especially in science subjects, i.e., biology, chemistry and physics. These subjects are very paramount to the Science-driven society that Nigeria is advocating for. Biology is one of the subjects offered at the senior school. It is concerned with the study of life and living organisms. It is very germane to the understanding of the functioning of the body system as well as a functioning ecosystem.

Adaptation is one of the contents offered at senior secondary school 1 student. Report had established inadequacy of students with respect of understanding adaptation concept. The chief Examiners' report of 2014 reported the inability of students to explain how the modified stems perform their function. As a way of contributing our quota to alleviating the problem, this study explored the effect of team teaching on students' achievement in adaptation in Ilorin, Nigeria. The study also determined the difference influence of gender and score level on the achievement of students in adaptation when team teaching is used.

Purpose of the Study

The main purpose of this study is to investigate the effects of team teaching on achievement of student in adaptation concept of biology. Specifically the study examined the:

(i) Difference in the achievement of students taught adaptation using team teaching strategy
(ii) Difference in the achievement of male and female students taught adaptation using team teaching strategy
(iii) Difference in the achievement of high, medium and low students taught adaptation using team teaching strategy.

Research Questions

The following questions were raised in the study.

(i) Do students achieve differently when taught adaption with team teaching and when taught without team teaching?
(ii) Is there a difference in the achievement of male and female students when taught with team teaching method?
(iii) Do students with different score level achieved differently when taught adaption using team teaching method?

Research Hypotheses

(i) There is no statistically significant difference in the achievement of students taught adaptation using team teaching and those taught without.
(ii) There is no statistically significant difference in the achievement of male and female students taught adaptation using team teaching method.
(iii) There is no statistically significant difference in the achievement of high, medium and low scoring students taught adaptation using team teaching method.

Literature Review

Team teaching may be described as collaborative teaching; it is a method of teaching whereby two, three or more teachers teach a subject together instead of the usual one teacher to a subject. Robb (2009) described team teaching as several variations of technique to teach a course with more than one instructor. Esomonu, Akudolu and Ezenwosu (2015) defined team teaching as strategy involving two or more teachers each with distinctive roles, responsibilities, presentation, and evaluation for the same group of students. This goes together with the neither identified characteristics provided by Nor, Ibrahim and Tarmizi (2014) that team teaching encourages varying manner of assessing subject matter, different styles and method. This implies that team teaching afford students with qualities that are lacking in single teaching.

Working collaboratively or as a team is not restricted to teachers, students also team learn. Students learn as a team is evidence from the work of (Rafael & Jose, 2013;Gucciardi, Mach & Mo,2016;) . Some of the works that were reviewed looked at team teaching from the descriptive point of view while some explored it from experimental perspectives. The study of Rafael and Jose (2013) assessed a situation of collaborative learning and interdisciplinary applied to entrepreneurship. This study was conducted in Spain and students collaborate their potential through wiki forum in a virtual class.

The general and special education teachers' perception of teamwork for inclusive classroom and elementary and secondary schools was also explored by (Gebhardt, Schwab,Krammer &

Gegenfurtner 2015). The study focused on elementary and secondary teachers' perception and found that the perception varies. Gucciardi, Mach and Mo (2016) worked on Students-faculty team teaching- A collaborative learning approach. The study concluded that peer tutors reduced students' anxiety, increased engagement and availability of help inside and outside class.

From the experimental perspectives, the effects of team teaching on students' academic achievement in English Language comprehension in Awka, Nigeria was researched on by Esomonu, Akudolu, &Ezenwosu, 2015).Team teaching significantly enhanced the students' performance in comprehension. In the like manner, Nandwa (2017) conducted a research on likely effects of team teaching in mathematics in Mumi as sub-county Kenya. The outcome revealed a significant difference in favour of the team teaching group.

It is evident from the reviewed literature that team teaching is well known method that across nations. Some of which are Austria, Kenya, Nigeria and Spain. The review often revealed that team teaching could be used at tertiary level and secondary school level. This study was conducted in adaptation, a concept in biology. The effectiveness of team teaching on students 'gender and score levels were also determined, hence the need to review studies on gender and score levels.

Otor (2013) investigated the difference in the achievement of students in difficult chemistry concept. It was found that a significant difference exist between them in favourof female. On the contrary, Omiola, Awolere and Ajala (2017) researched on effect of hypermedia- assisted instruction on achievement of students in photosynthesis concepts in biology. The study reported non-significant difference in the achievement of male and female students taught photosynthesis using hypermedia- assisted instruction.

The score level and effectiveness of problem-solving approach of physics students in Kwara state was examined by (Adeniran, 2011). The study found that low-score level students performed best with a mean score of 20.68, followed by average 18.16 and high 14.25 score level.

Methodology

The research is a quasi-experiment of the pretest, posttest, non-randomized, control group design. The design was 2 x 2 x 3 factorial design. The factors are instructional strategies, gender and score levels at 2, 2, and 3 levels, respectively. The population for the research was all Senior Secondary School students' offering Biology in Ilorin, Nigeria, while Senior Secondary School one (SSS I) students offering Biology were be the target population, because adaptation is a topic students are expected to be taught at SS I level. Purposive sampling technique was used to select two co-educational public secondary schools in Ilorin since gender was one of the moderator variables.

The research instrument was the Adaptation Achievement Test (AAT) which contains 20 multiple-choice items on adaptation based on the school curriculum. Face and content validity of the instrument was be carried out with the assistance of the Biology education experts from the Department of Science Education, University of Ilorin and three secondary school Biology teachers. The lesson lasted for a period of two weeks for the administration of both pretest and posttest, and delivery of lesson as contained in the scheme of work. The instrument was trial tested on students from another school, who did not part take in the study of the schools that

was engaged in the research to determine its reliability using Pearson product moment correlation statistics. A reliability value of 0.87 was obtained after undergoing the reliability test.

The researchers also ensured that all ethical issues guiding the use of human subjects were strictly adhere to and also ensures that the lessons were delivered by the teachers at the specific time allotted to it on the cooperating schools time-table. Data generated from the research were analyzed using Paired sampled *t-test* and one-way ANCOVA.

Results

Research Question One: Do students achieve differently when taught adaption with team teaching and when taught without team teaching?

Hypothesis One: There is no statistically significant difference in the achievement of students taught adaptation using team teaching and those taught without.

Table 1 present the result of the differences in the achievement of the two groups. The table revealed that$t$ = 0.62at p > 0.05, since the p value is greater than 0.05, the hypothesis is thereby retained. This shows that there is no statistically significant difference in the achievement of students taught adaptation using team teaching and those taught without.

Table 1

The t –test Analysis of the Differences in the Achievement of Team Teaching and Control

Group	N	X	SD	*T*	Df	Sig. (2 tailed)	Remarks
Team Teaching	36	9.03	3.19	0.62	97	.0.54	Not rejected
Control	63	8.61	3.15				

Research Question Two: Is there a difference in the achievement of male and female students when taught with team teaching method?

Hypothesis Two: There is no statistically significant difference in achievement of male and female students taught adaptation using team teaching method.

The analysis in Table 2 presents the result of the differences in the achievement of the two groups. The table revealed at – value of 2.62, at p > 0.05, since the p value is greater than 0.05, the hypothesis is thereby retained. This shows that there is no statistically significant difference in the achievement of students taught adaptation using team teaching and those taught without.

Table 2

The t –test Analysis of the Differences in the Achievement of Male and Female Taught Using Team Teaching

Group	N	X	SD	*T*	Df	Sig. (2 tailed)	Remarks
Male	22	8.00	3.16	2.62	34	0.44	Not rejected
Female	14	10.84	2.56				

Research Question Three: Do students with different score level achieved differently when taught adaption using team teaching method?
Hypothesis Three: There is no statistically significant difference in the achievement of high, medium and low scoring students taught adaptation using team teaching method

Table 3 indicates the result of the differences in the achievement of students based on score level. The table revealed that $F_{(2,32)}$= 0.29 at $p > 0.05$, hence score levels had no significance difference when exposed to team teaching method , the hypothesis is thereby retained. This shows that there is no statistically significant difference in the achievement of students taught adaptation using team teaching and those taught without.

Table 3: The ANCOVA of the Differences in the Achievement of High, Medium and Low Students Exposed to Team Teaching

Source	Type III Sum of Squares	df	Mean Square	F	Sig
Corrected Model	97.19	3	32.40	4.02	0.01
Intercept	129.12	1	129.12	16.03	0.00
Pretest2	29.84	1	29.84	3.70	0.06
Score levels	4.71	2	2.36	0.29	0.75
Error	257.79	32	8.06		
Total	3289.00	36			
Corrected Total	354.97	35			

a. R Squared = .274 (Adjusted R Squared = .274)

Discussion
There was no statistically significance difference in the achievement of students taught adaptation using team teaching and does taught without. This result might be due to the fact that the sampled is skewed towards the control. The non-significance could also have resulted from unpopularity of the method at the secondary school level. The result agrees Esomonu, Akudolu and Ezenwosu (2015); Nandwa (2017).

A statistically significant difference does not exist in the achievement of male and female students taught adaptation using team teaching. This may be due to the fact that the two gender feel indifferent to the method. This is in line with the study of Omiola, Awolere and Ajala (2017). The result of the study disagrees with the finding of Otor (2013).

There was no statistically significance difference in the achievement of high, medium and low students taught adaptation using team teaching. This is to say that team teaching does not have a leveling effect on score levels. This supported the finding of Adeniran, (2011) which revealed that low scoring students benefitted most though not significant.

Conclusion
The following conclusion were put up from the results of the study
(i) Team teaching does not enhance the performance of students in adaptation
(ii) Gender is not a determinant of students' achievement in adaptation when exposed to team teaching strategy.
(iii) Team teaching is not a good method for reducing the gap existing among high, medium and low scoring students.

Recommendations

The following recommendations were made in line with the study.

(i) More awareness should be created on why team teaching should be used at secondary school level.

(ii) Male and female students should be encouraged to learn as a team in-order to familiarized them with the method at that level of education

(iii) Teachers should pay special attention to all levels of students in his / her class, this is to ensure a better performance by every student.

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THE DESIGN AND EVALUATION OF A WEB-BASED E-LEARNING PLATFORM FOR EFFECTIVE TEACHING AND LEARNING OF CHRISTIAN RELIGIOUS STUDIES IN SECONDARY SCHOOLS

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Abstract
Electronic Learning Platform is becoming increasingly significant in education as an effective means of delivering learning goals. This study presents Easy revision, a scenario-based-learning platform designed by the researcher by utilizing a free website builder and Information and Communication Technologies. The platform is based on the Books of the Bible, with links to curriculum content for Secondary School Certificate Examination. It also incorporates other learning materials in diverse modes including videos, podcasts, html pages and collaborative forums such as Wiki-spaces, blog and chat room plus privacy policy rights among others. The design process describes the iterative user-centred instructional approach adopted in the implementation and evaluation of the platform. Also, the results of the pilot study carried out at Government Secondary School Garki Abuja through interview and administration of questionnaire to students are presented. Additionally, the feedback in respect of the design rationales indicated user satisfaction in terms of accessibility, functionality, and usability, which are the focus of this study. The study concludes that teachers ; especially secondary educators can indeed design e-learning platforms to effectively engage and increase students' motivation to learn, and ultimately improve achievement. However, recommendations are offered including the need to train teachers in the design of learning platforms among others.

Keywords: Christian Religious Education, Effective Teaching and Learning, E-Learning Platform, Information Communication Technology, Instructional Design.

Introduction

Globally, E-Learning platform has been integrated as an essential element in educational settings to complement traditional classroom environments to create more efficient and attractive learning experiences. This platform integrates Information Communication Technologies (ICTs), with features and capabilities that support innovative pedagogies which have significantly enhanced quality education. It also includes interface for the creation of learning content in different formats and modes such as text, image, sound, message boards, forums, video-conference, etc., **(**Gökova & İnceoğlu, 2011; Sanchez & Hueros, 2010). Thus, e-platform supports network learning that offers students unlimited opportunities and possibilities to explore and acquire new knowledge and skills in various dimensions. E-Learning platforms (e.g., Blackboard/Web CT, Moodle, etc.) have gained prominence especially in higher education because of its components that have relevance to instructional process. It therefore becomes imperative for secondary educators to adopt or design e-learning platforms for effective teaching and learning, especially in this technological age**.** Research also affirms that teachers are more likely to use instructional technology which they personally set up for instruction (Ezekoka & Obiukwu, 2015).

Thus, the use of e-learning platform to effectively support the teaching and learning of Christian Religious Education (CRE) in the Senior Secondary curriculum becomes imperative in order to offer students diverse learning opportunities. In contrast to traditional classroom settings, the use of this platform would provide multiple learning modes and exploratory resources that will redesign students activities such as interaction, conversation, collaboration, feedback, etc.(Costa, Alvelos & Teixeira, 2012), which motivate students to learn and supplements classroom lessons by including materials and activities that cannot be achieved within limited traditional settings. Students can access these materials and complete activities such as assignments, projects, etc., while collaborating with others. Hence, the goal of this study as exemplified in the design of *Easy revision*, which is to make the teaching/ learning of CRE more engaging and motivating, which will ultimately increase learning outcomes.

E-LEARNING PLATFORM

The e-learning platform represents a system, which provides integrated support for six different activities: creation, organization, delivery, communication, collaboration and assessment (Piotrowski, 2010). There are different descriptions of e-learning platforms across literature such as Course Management System (CMS), Web-Based Learning Environment (WBLE), Virtual Learning Environment (VLE), etc. Prior research supports the designing of e-learning environment especially by instructors to enable them leverage a variety of ICTs to create suitable platform for instructional processes (Sales, 2010). This also develops the instructors' creative abilities, increases their productivity and teaching efficiency (Mahmoud, 2008). However, research indicates that designing or adoption of e-learning platforms present some challenges in the functionality of most learning design tools (Caputi & Garrido, 2015). Moreover, critical factors considered for a successful designing of web-based platforms include among others pedagogic and design rationales (Nam & Smith-Jackson, 2007). The following section presents the rationales for creating the *Easy revision* e-learning platform.

PEDAGOGIC RATIONALES

Several pedagogical assumptions underlying the design of *Easy revision* platform tend to align with constructivist learning assumptions that learning process is highly individual and cannot be controlled but only enhanced from outside (Launer, 2010). The platform will be learner-center, allowing learners to interact with their environment and collaborate with each other in order to construct knowledge. In addition, learning content will be presented in a logical manner including multiple lesson formats, provision of effective and interactive digital contents, applying appropriate ICTs, both synchronous and asynchronous tools, as well as utilizing clearly defined assessment and feedback techniques. It is assumed that such units of instruction increase students' motivation and compels learners to learn which will ultimately improve achievement.

Learner Characteristics

Understanding the characteristics of learners is an important factor for providing successful web-based learning. Thus, learner characteristics have been identified including possession of a great deal of *s*elf-regulatory skills such as self-motivation and self–directed study skills, time management, computer skills, confidence and competence in working within an electronic environment (Abubakar & Adetimirin, 2015). The learners in this study are boys and girls between the ages of 15 and 18 years at Government Secondary School Garki Abuja, with different learning styles and preferences and no explicit unique learning characteristics. Gail, Judith and Mark (2007) found that 78% of students in this age range download music or videos, and 82% use social networks in their daily lives, which suggests that these learners

might possess the basic technical skills necessary for the intended learning. In addition, they need a great deal of independent and self-regulatory study skills that cannot be developed purely through the routine teacher-instructed approach. Thus, they need exploratory resources, and to be motivated by the mediating artefacts (for example, the *Easy revision* platform), will enable them become successful learners.

Learning Content

Religious Education (RE) involves reflecting critically on different religious issues and events which makes the task of teaching/learning RE most exacting (Schools Council, 1967). *Easy revision* presents lessons on the Books of the Bible with links to specific curriculum content in different modes. These include: The Bible in Chronological Order, Divisions and Categories of the Books of the Bible including themes from the Old and New Testaments. It also provides 24/7 access to e-resources and multiple channels that support collaborative learning which have the potential to engage and motivate learners with positive results for their learning (Kuo, Walker, Belland& Schroder, 2013).

DESIGN RATIONALES

A learner scenario (Mor, 2013) was developed and the consideration helped to identify the required components and website functionality that will support the pedagogical strategies. Several design issues that arose included the provision of a Homepage introducing the website easyrevision.com; a navigation bar that links the web pages; an audio player; downloadable resources – both videos and html pages; an account for students, such as Wiki-spaces, blog and chat room; a calendar that will show timelines; clear links to online resources; external links that open in new windows; and, secure and private spaces with privacy policy.

Considerations in Making the Design

This study addressed the issues of usability, accessibility and functionality while developing *Easy revision*. Usability refers to "users' being able to use a product in a specific context in an effective, efficient and satisfying way" (ISO, 1998 cited in Tüzün, Sarica, Cetin &Alir, 2016). In that line, *Easy revision* provided a universal design that will be easily usable without the need for adaptation (Norman, 1998). In terms of accessibility, *Easy revision* tried to present an all-inclusive learning platform suitable for learners of all abilities, and from diverse cultural backgrounds which can be accessed from any location at any time (Young, 2004).

IMPLEMENTATION OF *EASYREVISION*

Methodology

The idea of *Easy revision* was conceived with the aim of providing an e-learning platform for effective teaching and learning CRE as EDUC 5253M project (Student ID 200579347 – 2010/2011) at the University of Leeds United Kingdom. The study adopted Instructional design models which directed the design processes (Tüzün, Sarica, Cetin &Alir, 2016).Edmonds, Robert, Branch and Parched (1994) instructional design process Figure 1, was adapted and the fundamentals of this process integrated in a systems-theory-based model characterized by an input-process-output paradigm in figure 2. A modification of this approach is provided in the four-step design process shown in Figure 3.

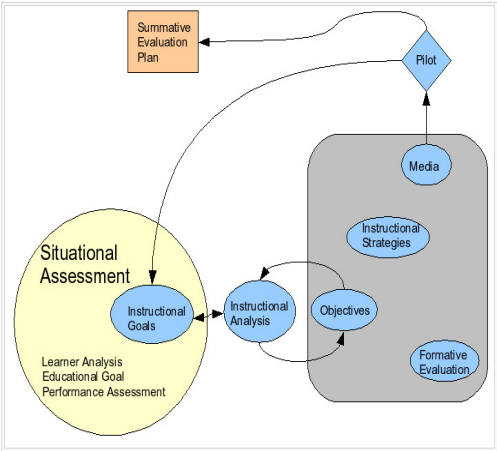

Figure 1: Fundamentals of the Instructional Design Process
(Edmonds, 1994, p. 54).

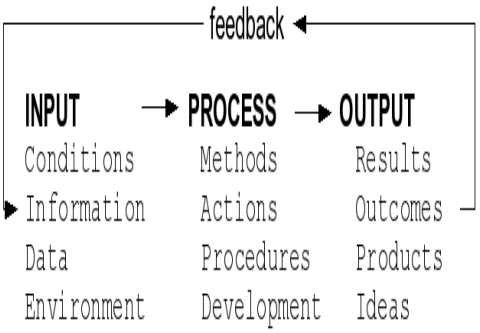

Figure 2: The System Approach.
Source: Edmonds (1994, p.56).

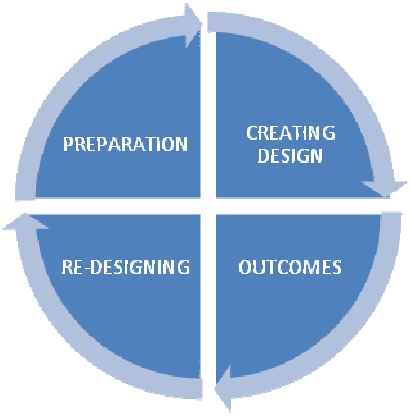

Figure 3: The design Process

The steps were applied in such a way that the continual iterative feedback (the ripple effect) from users and evaluators helped to make the *Easy revision* reality. A summarized design process is presented below.

Preparations

This study started with gathering relevant information and ideas in order to establish the instructional goal. Data was collected in terms of the learners' needs and the system requirements through a written scenario, followed by choosing the appropriate instructional strategies including learning content and online media. Then the Weebly software (a free and easy to use website builder) was selected, and a custom domain name was conceived and registered as: www.easyrevision.weebly.com.

Creating Design

The Weebly tutorial manual procedure was followed to develop the learning platform. The Homepage was created by downloading images (that would depict the concept of the site and engage the learners) from the Internet and uploading them to the site, such as Bible Flannel Board and Bible Bookcase. Other pages were created and linked to the navigation bar (such as About Us, Books of the Bible), along with Curriculum Content and Online Resources.

Due to the limitations of Weebly's customized template, a limited number of pages were created on the Navigation bar, other pages (such as Join the Conversation, and the Question Database, Contact & Support, Terms & Conditions, Privacy Policy, Acknowledgments, etc.,) were linked through the 'More' button and a Site Map was included to link the pages. These pages were developed by adding data and links that make it easy for learners to connect the content with that from other sites. For example, different Bible images were downloaded from the Internet and alternative texts added to depict the images on the site with links that open in new windows. Also, the Custom HTML Element feature was used to embed interactive tools such as blog, wiki and Dabble board for chat room (Figure 4), and accounts were created for learners to enable them participate in asynchronous and synchronous discussions.

Blog Page **Wiki Page** **Chat Room**

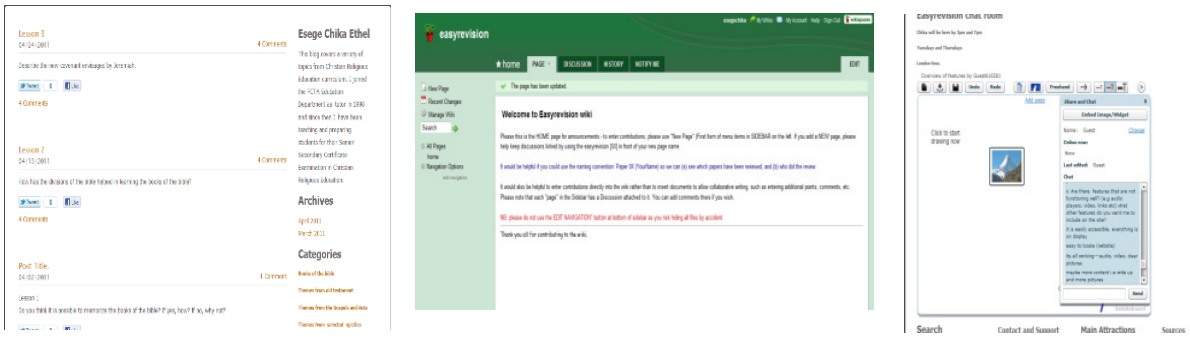

Figure 4: *Easyrevision* Blog, Wiki and Chat Room

Further, the audacity software was used to capture real-time audio contents for the "Welcome to *Easyrevision*" and"Lesson One", and the files exported as MP3s to reduce the file size for faster download, and the audio player element was used to embed it on the site. Moreover, YouTube videos on the books of the Bible were downloaded and embedded as well as eFolio software to provide evaluation platform for learners (Figure 5). Then links for other external videos, puzzles and games were created in order to give the learners the freedom to download and use them at their own pace.

Audio Player You Tube Video on Books of the Bible eFolio Software

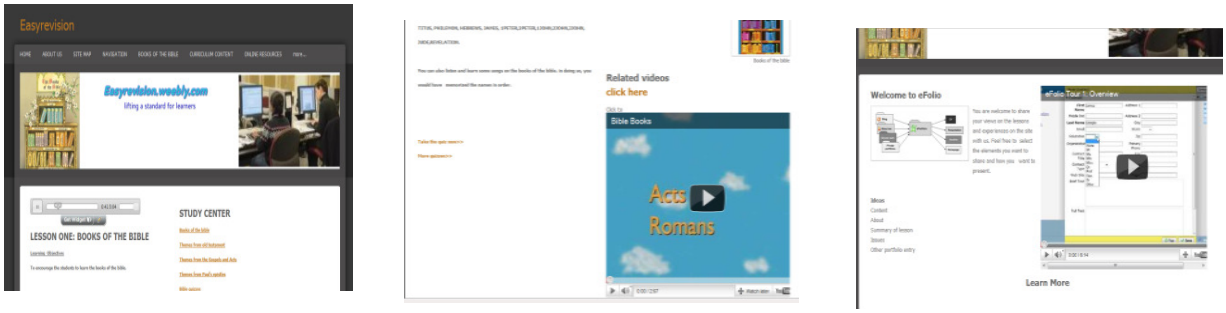

Figure 5: Embedded Audio player, You Tube on Books of the bible &eFolio software

Outcomes

The self-troubleshooting evaluation results to test the product's potential for accomplishing the goals suggested that some design changes were necessary. For example, there were too many pages, and they were not opening fast enough. Also, the links on the Site Map did not work and

the uploaded audio widget did not appear on the published site. The researcher sought support from more knowledgeable peers and invited three colleagues to join in the evaluation.

Re-designing

The formative evaluations lead to identification of problems and recommendations for improving the product. The feedback from the students for example, resulted in changes which helped in the re-designing work. Most of their contributions are presented in the evaluation report below.

EVALUATION OF THE SYSTEM

The evaluation model of Dick and Carey (1996) was adapted to carry out the evaluation of the platform, which has four approaches: 1) subject matter expert review, 2) one-to-one evaluation, 3) small group evaluation, and 4) field trial. However, this study used self-evaluation in stage 1 and Expert review again in stage 5 (which is the summative evaluation that would be performed after administering the learning platform to the target audience) to finally evaluate the *Easy revision* platform. A modification of this model into five-phased evaluation process is presented in Figure 6. Due to page restrictions, only the responses from the pilot study of the sample group would be used in this analysis.

Evaluation Process

Self-Evaluation

The self-troubleshooting evaluation to test for the functionality of the features and to identify other possible problems revealed minor practical, theoretical and technical concerns. These issues were resolved through applying hints from Weebly help menu and guidance from experts.

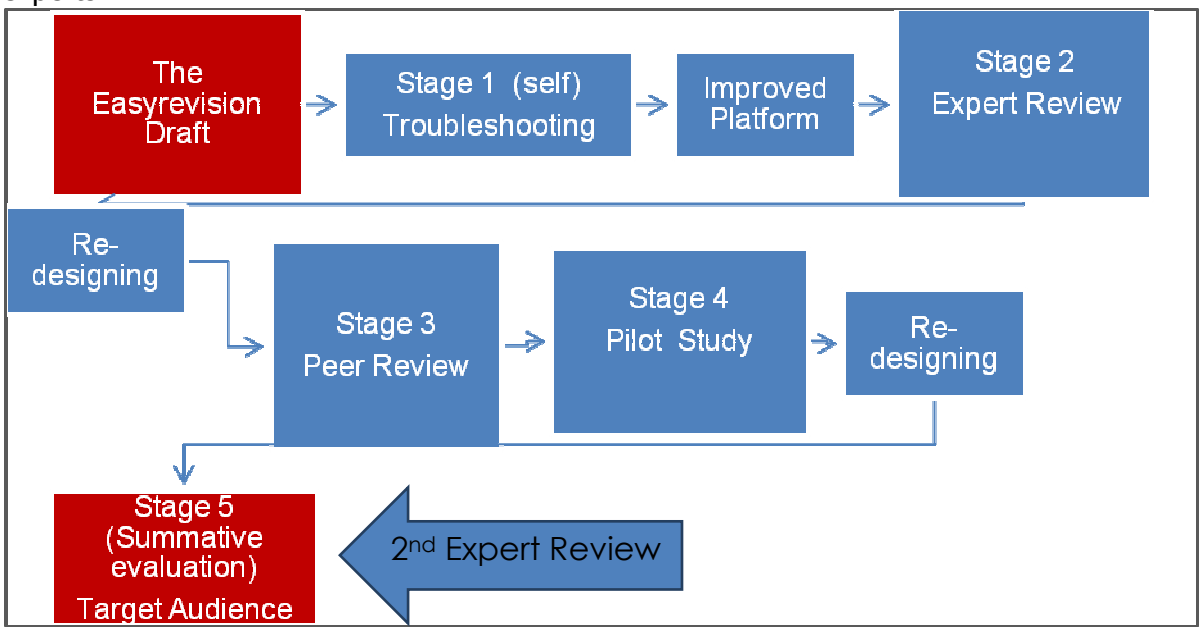

Figure 6: The five-phased evaluation process

Expert Review

Two of the module tutors in instructional design; an Associate Professor and a Ph.D. holder (subject matter experts) performed the first and second expert review of the platform, which

also served as the evaluation of the project. They suggested recommendations especially on technical challenges which were used to modify the instructional system. For example, the podcasts did not play. With the expertise guidance, the researcher successfully embedded a widget for the *Easy revision* Home Page and an MP3 widget that played the lesson podcast, thus providing a further mode of learning. However, the overall quality of the instructional design components was good.

Peer Review

This evaluation session was conducted with three colleagues (a female Ph.D. candidate, and a male and female CRE teachers from GSS Garki Abuja who are skillful in computer usage) in One-to-One Evaluation. They used the site to identify certain evaluation conditions that were not fully met in terms of functionality, accessibility and usability. Several criteria and objectives were used to ascertain the overall quality of the learning platform through observation as shown in Table 1.

Table 1: Observation Schedule

Observation	Summary of findings
1 To find out how easy it was to use and access the site.	Easy to access and to use
2 To ascertain the extent to which the site loads and displays in different browsers.	Presentations are similar on different browsers such as internet explorer and Mozilla Firefox
3 To see if the links are working well.	Links work
4 To know which of the features or contents to remove, change, improve upon or incorporate.	To reduce number of pages and length of To include print option

Results of the findings informed changes to the design of the learning platform as some of the evaluation criteria were not met. However, some positive comments revealed peer's satisfaction with the site. For example, they were satisfied with the easy-to-use interface, the white background with simple content that made it easy to read the texts, the short pages that made scrolling up and down quick and easy. They also reported liking the navigational links that created fast interaction within the site and with external resources, the catchy images (such as the site logo, which was in the same colour on every page).

Pilot studies

The pilot study was carried out in the Department of Social Sciences at GSS Garki Abuja through interview and administration of questionnaire to an intact class with 32 CRE students. This evaluation was another way of investigating how users assessed the functionality, usability and accessibility of the platform, which are the focus of this study. To test the questions, a Ph.D. research student piloted the study. After gaining positive feedback from the pilot, a questionnaire page was created on the site for the students to fill in after they had completed lesson 4:1. The pilot study revealed that users (75%) liked the organization of the site as shown in Figure 7.

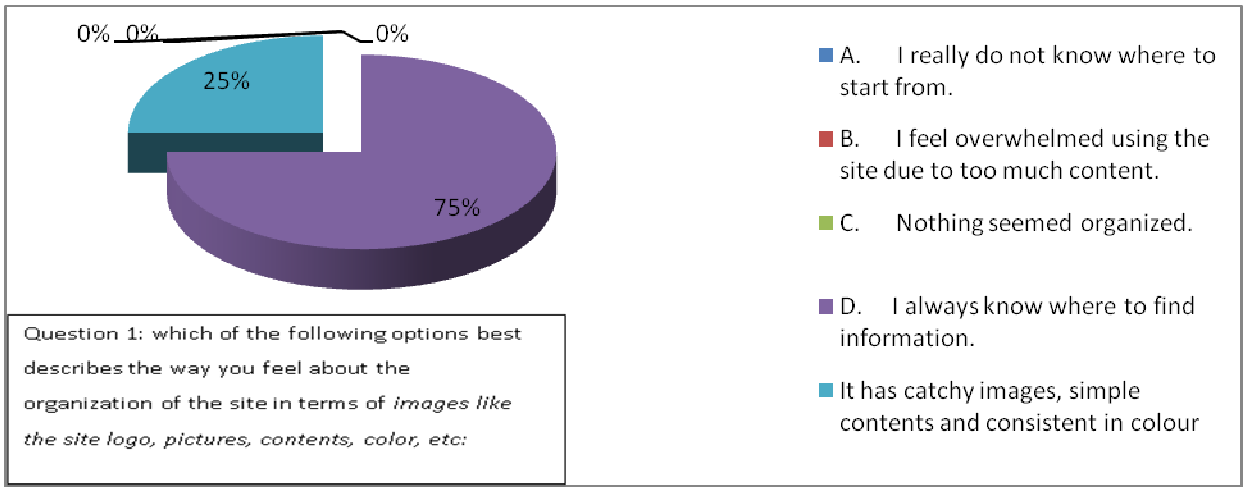

Figure 7: The results of Q1 in Pie Chart

Also, 100% either agreed or strongly agreed that they did not need any assistance in navigating the site that the site was easy to access and use. Moreover, 50% agreed that the site loaded fastest on Mozilla Firefox, while 25% reported that the site loaded slowly when they used Internet Explorer. About 75% reported that the videos played well and that the images were clear. On the contrary, eight users reported that they could not stream the video, and also had difficulty listening to the podcast as shown in Figure 8. This may have been because they used hand-held devices, as indicated in their interview responses.

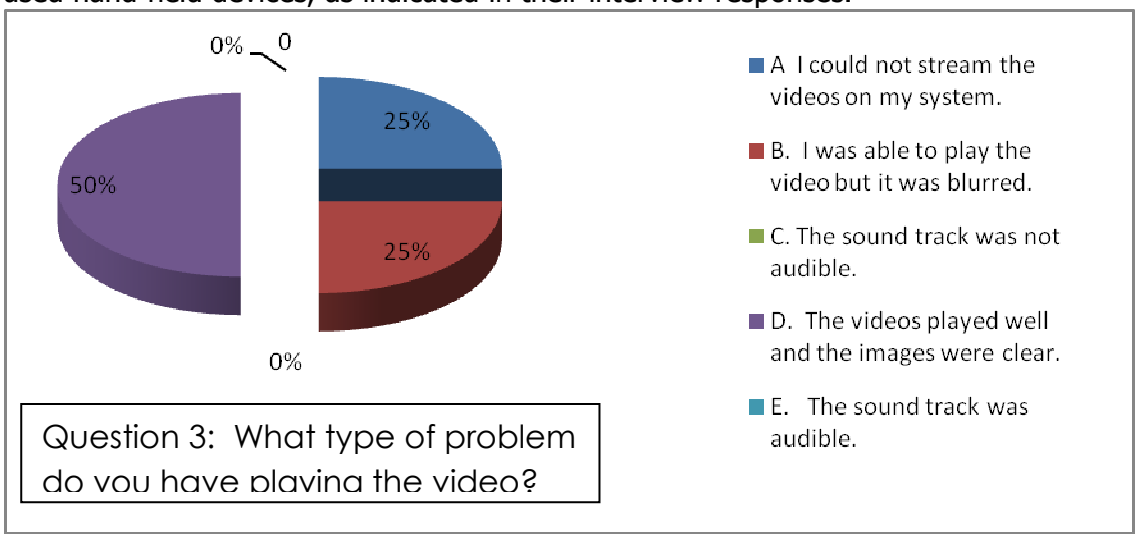

Figure 8: The results of Q3 in Pie Chart

With regards to other features they like on the site, 75% wanted more audio lesson content, music, videos, and games. Due to time constraints, the suitability of my pedagogy was not evaluated before this report. For example, learners are supposed to complete the syllabus in two months when they link to the curriculum content as envisaged in the scenario and embedded timeline below (Figure 9). Nevertheless, I was able to assess its usability to some extent, as the users were able to perform specific tasks, such as logging on for lessons, and contributing to both the wiki and the blog. In addition, an online interview with both the teachers and students via the *Easyrevision* chat room was used to test the functionality of the chat tool. During the chat, some students felt that the pictures on the Home Page were not

sharp enough, and suggested more High quality (HD) pictures. Therefore, new pictures were uploaded to alter the Home Page (Figure 9).

Old *Easyrevision* Homepage **New *Easyrevision* Homepage**

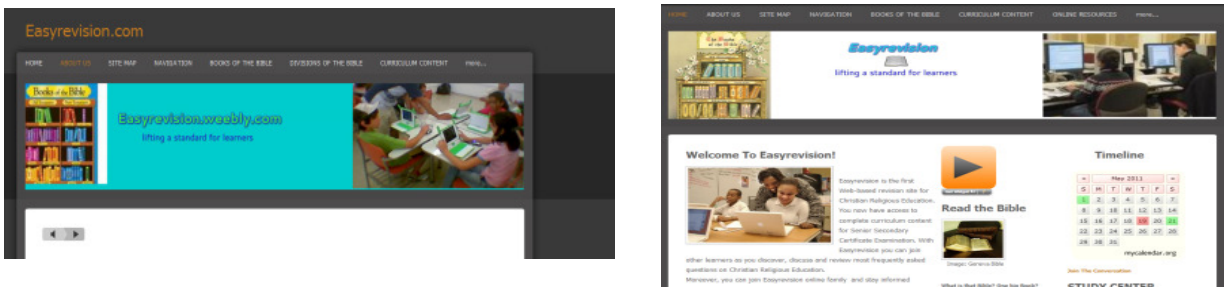

Figure 9: Old & New *Easyrevision* Homepage

ACCESSIBILITY TEST

To ensure that *Easy revision* is compliant with the standards for accessibility, privacy and site quality, a Web Content Accessibility test was performed using HiSoftware® Cynthia Says™ (at www.contentquality.com). *Easy revision* passed the test, and the Web Content Accessibility report is shown on figure 10.

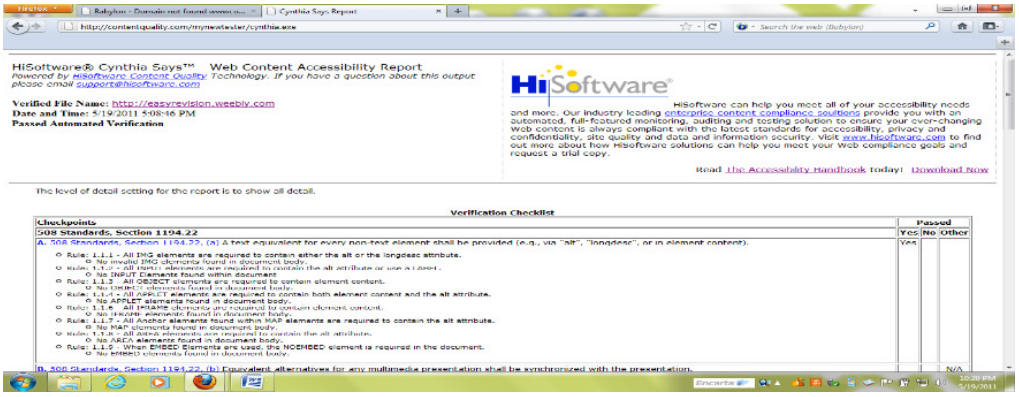

Figure 10: Accessibility Report

CONCLUSIONS

The main contributions of this study has been to detail the implementation of *Easy revision* e-learning platform using a free and easy to use website builder. Although this study is on-going, the platform is functional and available at www.easyrevision.weeble.com. The developed platform integrates ICT tools and various e-resources that provide diverse learning modes to

enable effective teaching and learning process. The evaluation results seem to demonstrate user satisfaction in terms of functionality, usability and accessibility of the learning platform, which are the focus of this study. Overall, this study shows that teachers can design e-learning platforms particularly for CRE that would engage and increase students' motivation to learn, and ultimately improve achievement.

Based on the conclusions, the study recommends among others the need for Governments and educational organizations to incorporate training programmers in teacher education curriculum; and teachers to explore free web building sites such as W3schools.com, wix.com, weeble.com, Godaddy.com, and others, to design all-inclusive learning platforms; plus more studies to support the extension of this work in the area of suitability and effectiveness of pedagogy which were not evaluated before this report.

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EFFECTS OF INTERACTIVE MULTIMEDIA RESOURCES ON ACADEMIC PERFORMANCE OF JUNIOR SECONDARY SCHOOL STUDENTS IN ZARIA EDUCATION ZONE, KADUNA STATE, NIGERIA

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Abstract
This study examines the effects of interactive multimedia resources, on academic performance of junior secondary school students in Kaduna state-Nigeria. The study was specifically aimed at determining whether there is significant difference between the mean academic performances of JSS students who were taught by way of Interactive Multimedia resources and those taught using lecture method. The study used JSSIII students as population from-which sample were purposively selected. The Social Studies Achievement Test (SOSAT) was the instrument for data collection. The mean, standard deviation and t-test independent sample were the data analysis tools. The study discovered that JSS students who were taught by way of Interactive Multimedia resources outperformed their counterparts who were taught through Conventional Lecture Method (CLM). In view of the above findings the study recommends the need for Kaduna State government to build and equipped computer laboratories in each secondary school in the state to facilitate effective utilization of the resources.

Key Words: *Multimedia Resources, Academic Performance, Effects, Social Studies.*

Introduction

The purpose of learning and teaching resources is to provide a source of learning experiences for students. Learning and teaching resources should be able to facilitate interaction among students and teachers during the learning/ teaching process, as well as to help students to learn, broaden students' learning experiences and meet different learning needs. If used effectively, learning and teaching resources can help students. to construct knowledge for themselves and develop effective learning strategies, generic skills, values and attitudes, thus laying a solid foundation for lifelong learning.

There are techniques that encourage the development of creativity, ability or provide experience not easily secured in any other way. These techniques are embedded in the use of Information and Communication Technology (ICT). Application of Information and'. Communication Technology (ICT) in teaching and learning has been widespread and popular with students and teachers and it promotes learning and teaching skills. One of the interesting aspects of ICT application is Interactive Multimedia Instruction (IMI). By Interactive multimedia, educators usually refer to the using of multimedia and Information Communication Technology (ICT) equipment which offer an effective dialogue between the resource materials-indirectly with the instructor and the students in. comparison with traditional methods of teaching which may lack such interactivity (Nusir, Alsmadi, Al-kabi, and Shardqah, 2011).

The term multimedia means more than one media. Multimedia are instructional programs that can be highly interactive and feature combinations of sound, animation, video, graphics, and text. According to Hostetler (2001), "Multimedia is the use of computer to present and combine

text, graphics, audio and video with links and tools that let the user navigate, interact, create and communicate". In other words, multimedia is the combination of various digital media, into an integrated multi-sensory interactive application or presentation to convey information to an audience, (Butcher and Powell 2005; Demodharan and Rengaranjan 2007). Therefore, multimedia is a learning tool that allows learners to organize, represent and construct knowledge in multiple modalities that include text, audios, graphics, animation and videos, (Wang 2006: 316). In addition, multimedia programs do not necessarily require Internet access.

Other than that, interactivity is also part of the elements that are required in order to compel interactive communication process through the use of multimedia. This involves combination of visual materials. It is considered therefore as a learning resource package which can be effective when several media are used concurrently for specific instructional purpose. When two or more pictures are projected simultaneously, on one or more screen for group viewing, the compound concept multi-image is used. However, when two or more different types of media are used, sequentially in a single instruction for self-paced learning package, the term multimedia is used. In this regard, in using multimedia or multi-image; a large amount of information can be passed across to students, and high interest can be created in students. Furthermore, media can be tailored towards different objective outlined for the lesson. Multimedia can be effectively used for instructional purposes, (Burden & Byrd, 1999). The use of multimedia in teaching and learning Social Studies is not only able to maintain students' interest but also able to make them enjoy learning. Furthermore, Cairn-cross and Mansion (2001) pointed out that multimedia has the potential to create high quality learning environments.

With multimedia technology becoming such an integral part of students'; lives, educators are incorporating it into projects to promote learning in their classrooms. The trend toward technology enhanced classrooms has escalated quickly at the turn of the millennium in Nigeria and students are increasingly becoming tech-savvy day by day. Students- are using multimedia to connect with different cultures and societies that can broaden their learning experience, (Warschauer, 1999). Technology provides an innovative way to reach and collaborate with students and educators all over the world. However, not only is technology useful in communicating with others, it also provides unique ways to complete assignments. Additionally, students learn better and faster when they are actively engaged in their learning. Digital media can be a great vehicle' for student engagement with classroom technology..." (Quinones, 2010:28).

However, it is apparent that many of today's teachers ;of Social Studies at junior secondary school level are caught in the midst of a change for which they may not have been professionally prepared. Many teachers were educated in the classrooms where the role of the student was to memorize information, conduct well-regulated experiments etc. and were then tested on their ability to repeat these tasks or remember specific facts. The problem of this study hingeson a determination of the extent to which interactive multimedia resources are used to achieve instructional effectiveness among social studies students at junior secondary schools in Zaria Education Zone, State, Nigeria.

Objective of the Study

The major objective of this study is to examine the effectiveness of Interactive Multimedia resources on academic performance of JSS students in Zaria Education Zone, Kaduna State, Nigeria. The study was guided by the following specific objective:

(i) To determine if there is difference in the mean, scores of students taught with. Interactive Multimedia Resources and students taught using Conventional Lecture Method;

Research Question

The study answered the following question:

(i) What is the mean score of students taught using Interactive Multimedia resources and students taught with Conventional Lecture Method?

***Null* Hypothesis**

The study tested the following null hypothesis at 0.05 level of significance:

H_{01}: There is no. significant difference in the mean academic performance score of students taught using Interactive Multimedia resources and students taught using Conventional Lecture Method;

Scope of the Study

The study entitled "effects of interactive multimedia resources on academic performance of junior secondary, school students in Zaria Education Zone, Kaduna State, Nigeria" is delimited to Zaria metropolis, Kaduna State, Nigeria. The study covered two junior secondary schools, namely; Alhudahuda and Barewa Colleges, Zaria. Social Studies students of JSSIII from the schools were used in the study.

Methodology

This study employed Quasi-experimental research design. It; is an impact evaluation that assigns members to the treatment group and control group by a method, other than random assignment (National Centre for Technology. Innovation, 2007). The population of the study consisted of all JSS students in Zaria Education Zone, Kaduna State, Nigeria. The study purposively selected two (2) Secondary Schools in the study area because of the availability of Computer Laboratory which were needed to expose the students in the experimental group to an instructional package using computer as a medium. The schools were Alhudahuda and Barewa Colleges, Zaria.

The study sample was 120 participants selected from the two schools on equal basis (60 from each school). The decision of picking sample size was based on the opinion of Olayiwola (2010).

The study used an instructional package called Social Studies Interactive Multimedia Package (SOSIMP) to assist in the teaching of experimental group. The package consisted of hypertext, animation, pictures and sound to assist the students in learning natural and artificial environment of man and their features. On the other hand, Social Studies Conventional Lecture Method (SOSCOLM) was followed to teach students considered as control group. The Instructional Package consisted of Lesson Plan, Instructional Materials (Pictures, Posters and Charts).

The students were pretested- before being exposed to the packages. The teacher-made test used to evaluate the students learning was named Social Studies Achievement Test (SSAT). The instrument was duly validated using table of specification and the reliability coefficient of 0.781 was ascertained using Guttmann Split-Half Coefficient test.

The data for the study were the scores of the teacher made-test (SSAT) obtained from the pre-test and post-test administered to the control and experimental groups. The study's research questions were answered using mean and standard deviation. However, t-test independent sample was used in testing the research hypotheses. According to Ekeh (2003), t-test is used for determining the significant difference between two mean.

Results and Discussion Research Question

This section answered the question raised by the study. The mean and standard deviation were used to answer the questions.
Research Question One: What is the mean score of students taught using Interactive Multimedia Resources and students taught with Conventional Lecture Method?

Table 1.1: Descriptive Mean Statistics of Experimental and Control Students

Treatment Groups	n	Mean	std.dev
Experimental (EV1I)	60	68.18	7.60
Control (CLM)	60	39.30	7.41

The details in table 1.1 shows the mean, academic performance of students who were taught using; Interactive Multimedia Instruction (DVII) and students taught with Conventional Lecture Method (CLM). The mean performances were 68.18 and 39.30 for experimental and control groups respectively. This by implication indicates that differences existed between, the two groups. The experimental group had higher mean academic performance than students in control group. This means that students who were taught with Interactive Multimedia resources have higher mean academic performance than students who were taught with Conventional Lecture Method.

Therefore, to answer research question, one it can be deduced based on the quantitative analysis presented above that differences existed between the mean academic performances of JSS students who were taught with Interactive. Multimedia resources and students who were taught using Conventional Lecture Method.

Null Hypothesis
Presented in tables 1.3 and 1.4 are results of the null hypotheses tested at 0.05 alpha. The hypotheses were tested using independent sample t-test statistics.

H_{01}; There is no significant difference in the mean, score of students taught using. Interactive Multimedia Instruction and students taught using Conventional Lecture Method;

Table 1.2: Independent t-test sample statistics on the mean performance of experimental and control group

Variable	Treatment Groups	n	Mean	std.dev.	df	t-Cal	t -crit	Sig (p)
Academic performance	IMR	60	68.18	7.69491				
	CLM	60	39.30	7.4065	118	20.948	1.96	0.000

Calculated $p < 0.05$, Calculated $t > 1.96$ at DF 118

The result emanating from independent sample t-statistics in table 1.2 above shows that significant difference existed between experimental students (IMR) and control students (CLM) in their mean academic performance. This was due to the fact that the calculated significance (P) value of 0.00 was less than the 0.05 alpha level of significance while the calculated t value of 20.95 was higher than the 1.96 critical t value at Df 118. In the same vein, their calculated mean academic performances were 68.18 and 39.30 for experimental and control group students respectively.

Based on the above, it was concluded that there was significant difference between the mean academic performance of JSS students who were taught by way of Interactive Multimedia Instruction (IMR) and their counterparts who were taught through conventional lecture method (CLM). Therefore, the null hypothesis which states that there was no significant difference between the mean scores of students taught by way of Interactive Multimedia resources and their counterparts taught through Conventional Lecture Method is hereby rejected.

Major Finding

The study discovered that junior secondary school students who were taught by way of interactive multimedia Resources (IMR) outperformed their counterparts who were taught through Conventional Lecture Method (CLM);

Discussion

The results of the study indicate that the Interactive; Multimedia Resources (IMR) as an instructional strategy improves the academic performances of JSS students.

Several studies conducted both within and outside the shores of Nigeria (Salihu, 2015; Tanko, 2015; Adoke, 2015 &Dauda, 2015) favored those teaching strategies that enhance learners' participation in the teaching and learning process. The studies also discovered that teacher-centered approaches to instruction stifle students' interest in the teaching and learning process thereby affecting students' academic performances negatively. The Interactive Multimedia Resources (IMR) is not an exception as it is part and parcel of learner-centered approaches to instruction brought about by the advancement in Information and Communication Technology (ICT) in this Digital Age.

Conclusion

Interactive Multimedia Resources (IMR) is a new way of assisting students to learn at their own phase. It is an. effective way of appealing to the senses of the learners; sight, hearing. By and large, it enhances active involvement of the students and all the learning taxonomies, thus, promoting effective transaction and communication between the teacher, the learner and the learning materials.

Recommendations

In the light of the above, the study made the following recommendations:

(i) There is the need for Kaduna State government build and equipped computer laboratories in each secondary school in the state. This will assist in effective utilization of IMR as viable instructional strategy for the 21st century teaching and learning;

(ii) There should be training and retraining of teachers on computer applications especially on Interactive Multimedia Resources. '.

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EFFECTS OF SIMULATION GAMES TECHNIQUE IN TEACHING ENTREPRENEURIAL SKILLS IN JUNIOR SECONDARY SCHOOLS IN ZARIA EDUCATION ZONE, KADUNA STATE

NURUDDEEN NURUDDEEN SAMBO

Abstract

This study examined the Effects of Simulation Games Technique in Teaching Entrepreneurial Skills in Junior Secondary Schools in Kaduna State. The design adopted for the study was quasi-experiment. The total numbers of students used for the research was one hundred and. twenty (120.) in which Simulation Games and Lecture techniques were used to teach the contents selected from Junior Secondary School curriculum. The data for the study was collected using a teacher- made test titled "Social Studies Achievement Test. The data gathered for the study; were analyzed using mean, standard deviation and independent simple-test statistics at 0.05 level of significance. The findings revealed, that simulation games technique increased students' academic performance at JSS level. The study recommends the adoption of simulation games technique in teaching entrepreneurial skills among at. JSS level in order to enhance their academic achievement.

Key Words: Simulation Games, Technique, Teaching, Entrepreneurial Skills, Junior Secondary Schools.

Introduction

Education has been defined as the process of imparting the right types of values, attitudes, skills and competencies in other to make the recipients useful to themselves and the society at large. One of the disturbing issue facing teachers today is that of engaging a wide and diverse group of learners'. Learners, as a result of different entry behavior and of course family background come to the school with varying degrees of motivation, commitment, ability, and learning styles or approaches (Muhammed, Salihu & Bayero 2016). According to Azriel, Erthal, and Starr (2005) regardless of age or economic, ethnic, or social background, people understand the: language of play'. Games offer a medium for students to explore and interrogate information in a fun and interactive way. This type of animated learning environment is critical for engaging students in the learning given the prominence of iPods, game boys, play stations and a wide variety of highly entertaining and Sci-fi television in young people's lives today (Muhammed, Salihu and Bayero 2016). In this regard, Biggs (2003) states that active participation in teaching and learning process by the students is better than being passive. Effective teaching methods stimulate students' interest which therefore forms a base for achieving desired objectives of teaching and learning. According to Salen and Zimmerman (2003) "A game is a system in which players engage in an artificial conflict, defined by rules that result in a quantifiable outcome."

Effective teaching methods stimulate learners' interest which therefore forms a base for achieving desired curriculum objectives at primary schools. Globally, teacher-centered teaching methodologies are considered obsolete; a big burden with little impact on the learning development of the child; the modem day educational systems emphasize strongly on those teaching methods that will fully and actively involved the child learner rather than considering him as passive, ignorant and a mere recipient of knowledge. In the light of the above, Plato in

Abubakar and Dantani (2005) advocated a child-centered education and his views have had a great deal of influence on modern educationists. He claimed that the child possesses within himself the potentialities for development, and that it's the task of the teacher to make these potentials develop itself instead of imposing some external measures.

Simulation Games are a representation of an actual physical or social situation reduced to manageable proportions to serve a specific purpose, or any context or play among adversaries, operating under constraints. rules for an objective like winning, victory or playoff, which have two characteristics: overt competition and rules (Yerima, 2007). According to Stolovitch and Thiagarajan (1980) in Adoke (2015) Simulation Games combine unique characteristics, which make it suited to situations where the stress is on interactive learning. It produces fun, effective learning and approximately the real world. They describe simulation game as a contrived activity which-corresponds to some aspect of reality. Simulation games provide opportunities for students to analyze problems, make decision, manage real life situations, control projects and experience the consequences of their actions.

The main reason why games are considered effective learning resources is that "they spur motivation and students get very absorbed in the competitive aspects of the games; moreover, they try harder at games than in other courses" (Avedon, 1971) in Kirkland and O'Riordan (2010). Naturally when playing games, students are trying to win or to beat other teams for themselves or on behalf of their team. They are so competitive while playing because they want to have a turn to play, to score points and to win. In the class, students will definitely participate in the activities. Therefore, it is possible for a teacher, to introduce students to new ideas, skills, values, attitudes, knowledge and so on. It can be clearly seen that games can capture students' attention and participation. They can motivate students to want to learn more. Moreover, they can transform a boring class into a challenging one (Kirkland and O'Riordan (2010), Furthermore, Ruben (1999) also claims that games can motivate students to learn from a social or affiliated need when the author claims that games offer an opportunity to promote collaboration and fosters active learning. Gaining skills in a variety of teaching methods are a fundamental part of the education of teachers. Different teaching strategies develop different skills in the learners. Varieties of teaching strategies make the teachers' job more.' stimulating and enjoyable and less boredom.

The importance of entrepreneurship for economic development cannot be over emphasized. Entrepreneurship is assumed to be a major source of innovation, job creation and growth (Audretsch, Carree, Van Stel and Thurik, 2002). Indeed, entrepreneurial behavior in its broader sense has become more important in bur. society (Gavron, Cowling, Holtham and Westall, 1998) where people face a more uncertain work environment, with multiple job shifts during a career, greater prospects of becoming self-employed, and where tasks increasingly require qualities such as independence, initiative and creativity (Bridge, O'Neill & Cromie, 1998). According to the National Bureau of Statistics (NBS), recent statistics show that unemployment rate in Nigeria has increased to 23.9 percent during the first half of the year 2014. In addition, to the already daunting statistics of over 43 million unemployed youths, an additional 1.8 million people joined the long queue. This was attributed to fresh entrants to the job market and worker layoffs across all sectors of the economy in the year. In a related development, Agi and Arikawei (2011) state that over 200,000 graduates are produced each year, only 25% are absorbed in the labour market. The remaining 7.5% are left in the labour market perpetually looking for jobs. Hence, this alarming rate of youth unemployment tell on the level of insecurity

in the country whereby youths are involved in terrorism, kidnapping, armed robbery, theft etc. This necessitated the need to inculcate entrepreneurial qualities in the. Nigerian child-learners at the Junior Secondary Schools so that they will grow with it (Muhammed, Salihu and Bayero). These entrepreneurial personal qualities like; determination, prudence, confidence, commitment, dedication, optimism, passion, open-mindedness, resourcefulness, objectivity, interpersonal relation and risk-taking etc. enable individuals to cope with and contribute to rapid social and economic change (Gibb and Cotton, 1998) cited in van der Kuip & Verheul, (2003).
It is against this background that this study examined the Effects of Simulation Games Technique in Teaching Entrepreneurial Skills in Junior Secondary Schools in Zaria Education Zone, Kaduna State.

Objective of the Study
The main objective of the study is to examine the effects of simulation games technique in teaching entrepreneurial skills in junior secondary schools in Zaria .Education Zone, Kaduna State, Nigeria.

Research Question
(i) What is the difference in the mean academic performance of JSS students taught with simulation games technique and those taught using lecture technique?

Null Hypothesis
H_{01}: There is no significant difference-in the mean academic performance of JSS students taught using simulation games technique and those taught with lecture technique.

Scope of the Study
The study covered JSSIII students in Zaria Education Zone. Specifically, the study covered GJSS KofarDoka, GJSS Chindit, GJSS Tukur-Tukur and GJSS Tudun-wada.

Research Methodology
The study used the non-equivalent comparison group. It is widely believed to be the most commonly Used of Quasi-experiment Shadish, Cook & Campbell, in Muhammed (2015). In its simplest form, it requires a pretest and post-test for a treated and comparison group. It is a design in which the effects of a treated or intervention are estimated by comparing outcomes of a treatment group and a comparison group but without the benefit of random assignment (Salihu, 2015). The researcher thus chose this design because of its suitable to the demands of the study.

This study utilized purposive sampling to choose the participating schools for the Quasi-experiment.; However, Olayiwola (2007) states that 30 participants of each group (experimental and control) are considered adequate, for this kind of study. This study used 120 students; 60 for experimental and 60 in control groups respectively.

This study used teacher-made test titled Entrepreneurship Skills Achievement test as an instrument used by the study for the purpose of testing the academic performance of students both in experimental and control group. The study used table of specification to determine the content validity of the test items.

The data for the study were the scores of the teacher made-test (SOSAT) obtained from the pre-test and post-test administered to the control and experimental groups. The study used mean and standard deviation to answer the questions raised by the study. Moreover, t-test independent sample was used in testing the research hypothesis. According to Ekeh (2003), t-test is used for determining the significant difference between two mean.

Results

Research Question:

What is the difference in the mean academic performance of JSS students taught with simulation games technique: and those taught using lecture technique?

Table 1.1: Descriptive statistics on the academic performances of students taught with Simulation Games technique and those taught using lecture technique

Techniques	↓	Mean	
Simulation Games	60	66.2333	7.07195
Lecture	60	46.6000.	9.4.8004

The table 1.1 revealed the academic performance of students taught using Simulation Games technique and those who were taught with Lecture technique. The mean academic performance of the Simulation Games group was 66.2333 and that of the Lecture group was 46.6000. This implies that students' who were taught with simulation games technique had higher mean academic performance than their counterparts taught with the lecture technique.

Hypotheses

The hypothesis formulated in the study was statistically tested using independent sample t-test. The outcomes of the statistical analysis are presented below to guide the study on either to retain or reject the null hypothesis set by the study.

Hypothesis One: There is no significant difference in the mean academic performance of JSS students taught using simulation games technique and those taught with lecture technique.

Tablel.2: Independent t-test statistics on the mean academic performances of students taught with simulation games technique and those taught with lecture method

Variable	*Groups*	*N*	*Mean*	*Std.dev*	*Df*	*t-cal*	*t-crit*	*Sig (P)*	*Decision*
Academic Performances	*Simulation Games*	*60*	*66.2333*	*7.0719*	*118*	*12:858*	*1.96*	*0.001*	*Rejected*
	Lecture	*60*	*46.600*	*9.4800*					

Calculated **p** *< 0.05, calculated t > 1.96 at DF 118*

Results from independent t-test statistics in table 1.2 above showed that significant differences existed in the mean academic performances of students taught with Simulation Games technique and those who were, taught with Lecture technique. Reason being the fact that the calculated p value of 0.001 is less than the 0.05 level of significance while the calculated t value of 12.858 is higher than the 1.96 critical t-value at Df 118. However, their calculated mean academic performances were66.2333 and 46.6000 for students taught with Simulation Games technique and those who were taught with lecture technique respectively. Therefore, the null hypothesis which states that there is no significant difference in the mean academic performance of JSS students taught using simulation games technique and those taught with lecture technique is hereby rejected.

Discussions

Results from the study showed that Simulation Games technique has significant positive effect on students' academic performance at Junior Secondary school student in Zaria Education Zone, Kaduna State, Nigeria. The findings of this study corroborated that of Dauda (2015); Adoke (2015). Their studies examined the effects of simulation games techniques on students' academic performances and found that simulation games technique was more effective in comparison to other teaching techniques of teaching especially the teacher-Centre approaches.

The lecture technique is considered ineffective due to the facts that, it creates little impact on learners' academic performance, because the lesson is dominated by a teacher, talking to the learners where the learners remain passively listeners and recipient of knowledge. There were little or no use of materials by the learners, the learners, level of abilities were not taken into cognizance by the teacher. It is believed that use of learner-centered approach make teaching and learning more interesting, make the classroom environment lively, arouse learners interest and sustained their interest and attention throughout the teaching and learning process as a result of involving all learners in the lesson through pairs and group work, learners of all abilities get opportunity to think, the teacher focuses on understanding not just memorization and recall of fact (Chiroma, 2014).

The Learners-centered approach to teaching and learning (Simulation Games) is supported by experiential learning theory. As Brookfield (1983) in Muhammed (2015) has commented writers in the field of experiential learning have tended to use the term in two contrasting senses. On the one hand, the term is used to describe the sort of learning undertaken by students who are given a chance to acquire and apply knowledge, skills and feelings in an immediate and relevant setting. Experiential learning thus involves a direct encounter with the phenomena being studied rather than merely thinking about the encounter, or only considering the possibility of doing something about it, Learners-centered approach to teaching and learning offers just that the second type of experiential learning is education that occurs as a direct participation in the events of life (Houle, 1980).

Conclusion

Therefore, based on the findings of this research, it is concluded that the simulation games technique is more efficacious than lecture method in teaching entrepreneurial skills in Junior secondary schools in Zaria Education Zone, Kaduna State.

Recommendations

In the light of the above, the study recommends the use of Simulation Games technique by Social Studies teachers in teaching entrepreneurial skills in Junior Secondary Schools in Zaria Education Zone, Kaduna State-Nigeria as it enhances effective transaction and communication between teacher and the students which in turns improves academic performances.

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ENHANCING PROJECT MANAGEMENT TRAINING THROUGH MENTORSHIP

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Abstract
Project Management profession is relatively new in many developing countries including Nigeria. There is often a misconception of the duties of a project manager vis-a- vis other older and more traditional professions in the built environment and engineering field. There also exists significant gap between the offerings of current curriculum in use for project management in the educational institutions and the skill set required by industry. This research therefore evaluates the impact of mentorship on training in the project management discipline. A mixed research methodology was used to determine those key criteria that enable or inhibit student performance for proper placement and integration into the labour market. The study evaluated student's adaptation to critical thinking skills and soft skills which are both essential for dealing with project complexities. The study used students' academic performance as measure for their levels of comprehension, assimilation of project management tools and techniques. Result achieved can be used to reduce attrition level and increase satisfaction among student and other key stakeholders.

Introduction

The study of Project management as a discipline is relatively new in the University system when compared to other development-based fields. Thus, the impact of mentorship in determining the quality of the professional training is significant. The development of future talents in project management would require tools like mentorship to bridge the gap in knowledge and inspire students for career development in the field.

The pedagogy concept of mentorship training is responsible for assuring a high level of penetration that would stimulate and incorporate standards (Porumb, 2015). The program aims at improving growth of students' education enrolment through the development of a mentee assistance system that is coherent, cohesive and sustainable (Hudson, 2013). The resultant growth is expected to improve the academic performance of project management students in tertiary institutions.

Historically in Universities, the project management profession was introduced about half a century ago and this was mainly in the engineering curricula. Arising from developments over time in computer systems especially in the 1950s, together with operational research and systems engineering management, earlier focus on project management education was on scheduling and optimization techniques to prepare students for working in multi-project environments (Bergmana, 2014). Subsequently, Project Management survived through certain professional certifications schemes by the Project Management Institute (PMI) founded in 1969 (Schwalbe, 2007).

In Nigeria, the field of project management has barely penetrated any of the 167 Universities. Till date, only a handful of the Universities are offering project management at either

undergraduate or post graduate level (National University Commission, 2018). This slow integration into the university broad training curriculum emphasize the need for mentorship programs to encourage the growth of the profession. Consequently, it makes it difficult to find qualified labour that can properly train according to international standards and develop the project management profession successfully (Saidoun, 2016)

Globally; project management is common in many industries in different ways, from large infrastructure projects, to small-scale projects. Nowadays, more institutions are regarding project management as being mandatory for their survival and all the organizations that were opponents to project management are now advocates. Today there is improved awareness of the importance of project management, not as singular and isolated undertaking, but rather as a means of structuring and simplifying complex tasks in a larger organizational setting (Bergmana, 2014). Lack of project management training often leads to irrational decisions based of intuition, emotion and even improvisation with no mastery of the objective (Saidoun, 2016).

Observably, mentorship application has lagged behind in most conceptualized fields, but is apparently absent or at best immature in Project Management. Therefore, the aim of this study is to investigate the perceived value of formal mentorship by conducting a survey on students of project management discipline in Minna, Niger state. There is therefore, a critical need to understand how educators can help and guide prospective mentees in establishing a strong link between practical and coursework to bridge the current gap existing.

Project Management Curriculum

The objective for the course is to achieve that, when completing, the student can be able to: formulate and evaluate projects, run processes, have knowledge of Project Management competences, and to perform managerial roles in identifying real market needs (Guerreroa, Palmaa, & La Rosaa, 2014). Project Management study curriculum of the Nigerian University Commission (NUC) is a 5-year program comprising 9 semesters of course and six months of industrial attachment. The last semester consists of the preparation and defense of a project under the guidance of supervisor who serves as a mentor. Some of the required courses are: Project Planning and Control, Research Methods, Operation Research, Projects Risk Management, Human Resources Management, Operation Management, Entrepreneurship, Contract Management, Computer for Project Managers, Quality Control, Materials Management, Marketing Professional Practice.

The Role of Mentorship in Project Management

In the study of Project Management, people are the most important asset and determine the success or failure of the project. An increasing number of young people are experiencing psychological, social and behavioral difficulties in their transition to adulthood which is problematic to development in society (Busse, Kipping, & Campbell, 2018). According to Hudson, Hudson, Gray, & Blaxham (2013) an experienced mentor should consider enhanced teaching and learning as a way to engage in professional dialogue which is necessary for education reforms.

Mentorship can be explained as a means to guide and instruct a mentee to grow and develop. Its benefits include the facilitation of socio-emotional, cognitive and identity development. It

further involves willingly sharing knowledge and resources to enhance teaching and training for positive mentor-mentee relationship(Hudson, Hudson, Gray, & Blaxham, 2013).

This agreement between two people whose share their experience, expertise and thoughts are put in order to promote personal and professional development to actively make use of a Mentor. The act of mentoring and being mentored can be hard as it involves people. Secondly, it requires compromises between two people with partially divergent interests in the context of a hierarchical relationship (Marini Abu Bakar, et al., 2013)

A one-sided benefit is a failure; a two-sided benefit is the goal of successful mentorship program. Whenever different personalities are involved, sharing and promoting positive experiences can be mutually benefitting to development.

Literature Review

Numerous studies reveal that students' poor performance in tertiary education are largely traceable to poor academic background with a range of other indicators contributing (Bradbury, 2010)(Hudson, Hudson, Gray, & Blaxham, 2013) (Porumb, 2015)Other identified factors include gender and age of student, fathers and mother occupation and educational level, the family income and size and the prior academic history in secondary School(Goga, Kuyoro, & Goga, 2014).The factors are not exhaustive and would require further research to consider other tools to improve students' performance, like Mentorship. There is also a need for a collaborative effort by teachers, parents/guardians, higher education administrators and students alike, to achieve the required level encouragement and motivation; and this, should be closely monitored within a structured system of mentoring.

To transform college education beyond the traditional education boundaries, a student-centered learning that focuses on educational practices and principles would provide students reasonable access to the knowledge and skills necessary for college and career readiness(Bradbury, 2010). Class exercises and drills alone do not contribute much to students 'competencies. Instead, specific tasks such as report writing, conduct interview, system development, research and analysis can enhance student competencies that surpass the knowledge and skills typically measured in achievement tests. These competencies include problem solving, analyzing, critical thinking, creativity, collaboration, data management and communication (Abubakar, et al., 2013)

According to Schwale (2007) understanding what motivates people and what ultimately enhance their performances include intrinsic and extrinsic motivation. However, mentorship which uses motivation as a tool can be considered as a means to influence the effectiveness of project management study in the university. For example, a student could have at least one academic supervisor, and one industrial mentor.(Sundströma, Widforssab, Rosqvistab, & Hallina, 2016).

The concept of mentoring can be described as a networking opportunity that provides advice, offer support and holds mentee accountable. It is a balance between good communication and strategic actions(Heikkienen, Wilkinson, Aspfors, & Bristol, 2018). Therefore, educators need to be more deliberate about the different aims, goals and values of mentoring which includes both formal and informal approach to mentoring. Figure 1 below illustrates the basic framework ofthis operation. However, research also indicates existence of gap in knowledge concerning

roles of top management and project management strategic application in organizations (Hyvari, 2015)

Several types of mentoring exist., namely -explicit modelling, constructive feedback, facilitate and nurture; critically self-reflect (Hudsona, Hudsona, Grayb, & Bloxh, 2013). Kang, Ran Yoo, & Park (2012) describes the process of mentoring as -Preparing, Matching, being a Mentor and Ending a relationship.

Traditional approach to mentoring provides students with emotional support, stress reduction and support in the development of novice instructional knowledge and skills(Monkevicene & Autukeviciene, 2015). Traditionally, mentorship is conceived as a long-term, face-to-face, bilateral relationship between an inexperienced student and an adult consultant in which the mentee's occupational, academic or personal development is encouraged(Erginer, 2009).

This educative mentoring style is oriented towards surviving and solving everyday problems. As a result, enables maturity of personality, professional development and career prospects.
Another type of mentorship is reformed based, by fostering change when students from universities and other educational institutions bring new theoretical approaches to mentors, and by so doing, mentors not only teach the students but also learn from them. Hence both learn together and enable change in teaching practice(Bradbury, 2010).

More recently, On-line mentoring has drawn attention from academia and industry due to its potential to nurture more effective communication between mentors and protégés. It has been an important task for mentoring managers to facilitate and support the activities of participants in online mentoring (Kang, Ran Yoo, & Park, 2012). These approaches encourage a robust structural format with enhanced system of feedbacks.

The figure 1 below illustrates personal development mentorship, academic and employability mentorship now considered as a professionally accepted means of personal development.

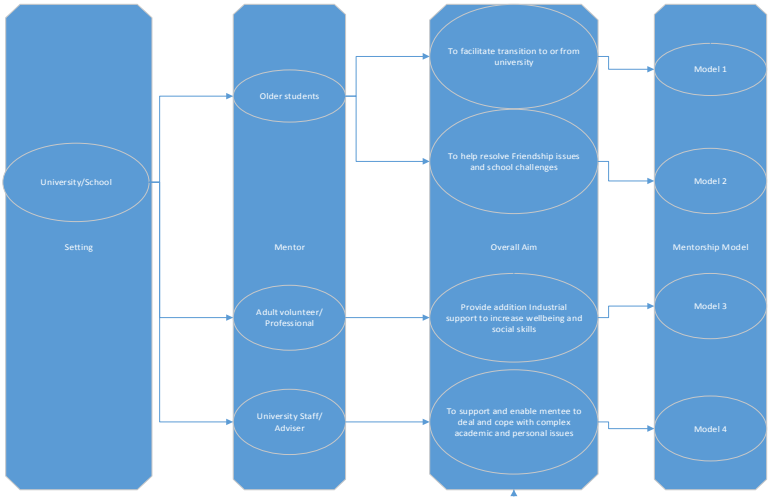

Figure 1: An adapted typology of formal mentoring programmes for a model in the Unit Kingdom(Heide, Campbell, & Kipping, 2018)

Methodology of study

The research was conducted by means of structured questionnaires administered to a study population of 239 scholars and graduates of project management of the Federal University of Technology, Minna; comprising undergraduate students of 400 level, 500 level, postgraduate students, and other graduates of the department. Their general experiences in the discipline would include industrial attachment and student industrial work experience usually organized internally.

Out of the 279 questionnaires issued to the above study population, a total of 179 returned completed questionnaires, thus, constituting 70% response rate. This is considered reasonable and adequate for a study of this magnitude, more so, considering the relative youthfulness of the department, having had its first grandaunts by 2015.

Subsequently, data obtained from survey results received were analyzed. The analysis was based on certain variables related to project management education with an aim of their categorization and formulation of learning outcomes for programme enhancement.

Result and Discussion

Table 1 below shows the distribution of respondents according to the gender, age, level of education and grade point performance. From the response obtained, 86%were male, reflective of admission disparity in the programme. Subsequently, 49% responded came from a graduate student from the department, while the general performance indicated that 52.2% of the respondents were student or graduate in second class lower level (2.5-3.4).

Table 1: Distribution of Respondents

Gender	Male	86%
	Female	14%
Age	below 25	25.8%
	25-30	52.5%
	30-35	11.7%
	35-40	3.3%
	above 40	6.7%
Level of Education	undergraduate(400&500L)	30.8%
	Graduate (B.Tech.)	45%
	PGD	5.8%
	Masters	17.5%
Academicperformance according to grade point	1.0-1.5	Nil
	1.5-2.4	20.9%
	2.5-3.4	52.2%
	3.5-4.4	22.4%
	4.5-5.0	4.5%

Source: Field Survey (June, 2018)

Subsequently, in figure 2 below the ratio of respondents indicated that choice of mentor is largely shared amongst University Staff (29.2%), Older students (11.7%) and Adult Volunteers (21.7%). However, about 21.7% of the respondents indicated lack of a mentor. A key factor that influences choice of an academic adviser or adult volunteer is someone with relevant academic and/ or professional standing which they could further use as a reference in their curriculum vitae. This incentive encourages the student to keep good relationship with someone that meets the requirement.(Bradbury, 2010)

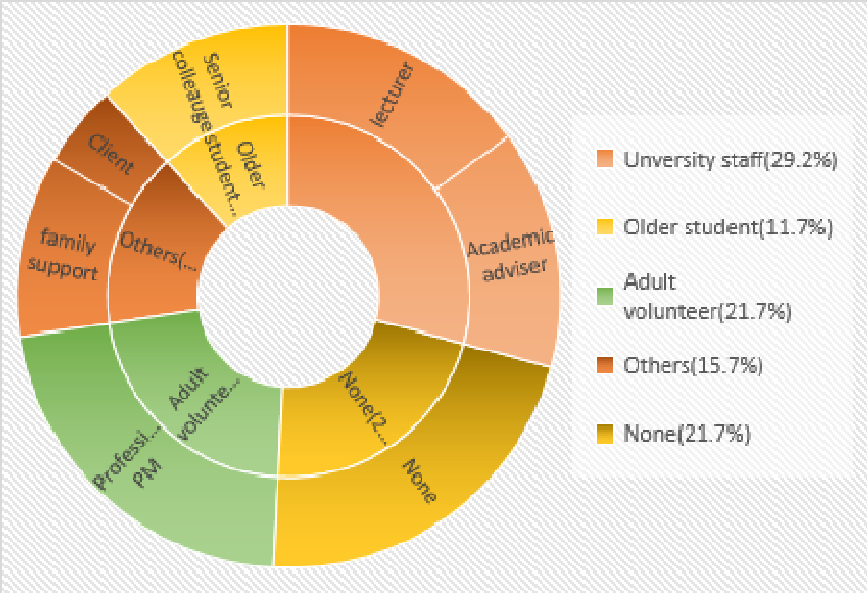

Figure 2: Source of Students' Project Management Mentorship
Source: Field Survey (June, 2018)

From Table 2, almost all respondents acknowledged their interest in the project management study. The concept of mentorship is largely vague to a lot of students and many view the role of a mentor more as informal and may unlikely disregard the advantages of any perceived benefits. From the table2 below shows that Project management as a discipline is generally appreciated by students studying it, with very few regrets. This positive view of Project Management encourages the implementation of mentorship programme, however the lack of it discourages over 44.8% of respondents from the programme. Furthermore, that survey revealed that 66.7% of the respondents have some form of mentorship and same percentage acknowledge that they are encouraged and motivated by their Mentors as shown in the table 2 below.

Table 2: Responses to Application of Mentorship in Project Management Study

Question	Yes(%)	No(%)
Interest in Project Management study	97.1	2.9
Regrets Project Management study	2.9	97.1
Existence of Mentorship encourages interest in the course	95.2	4.8
Lack of Mentorship does not affect interest in the course	55.2	44.8
Mentorship is available from Adult Volunteer/Older Student/University	66.7	33.3

Staff		
Receive Motivation and Encouragement from Mentor	67.6	32.4

Source: Field Survey (June, 2018)

However, having a mentor and interacting with them are two different things. Figure 3 below illustrates the frequency of mentorship meetings in an academic year. As indicated the number of meetings between mentee and mentor is often as the need arises (48.4%). However, 30 percent of the respondents have no session with any mentors. And based on the numbers of meetings for staff decreases the frequency increases.

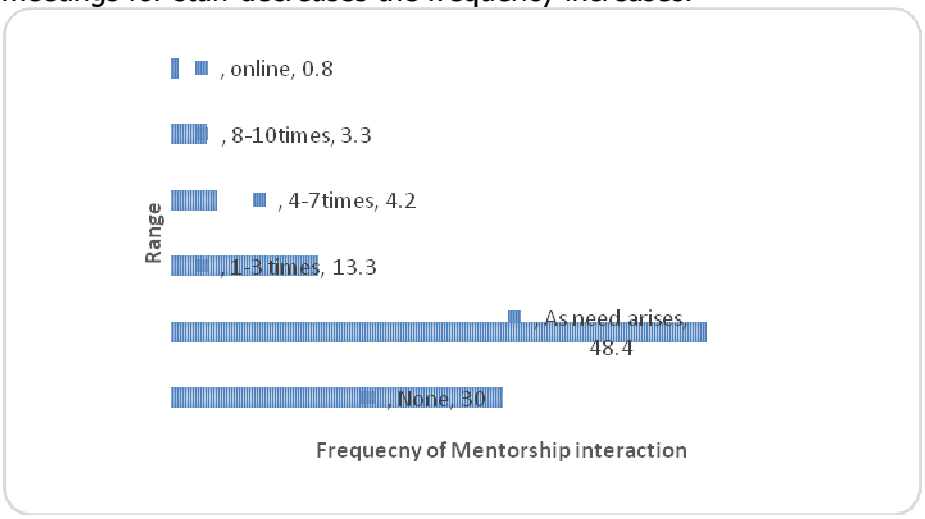

Figure 3: Frequency of Mentorship Meeting with students. Source: Field Survey (June, 2018)

Project Management discipline play a key role in ensuring the maturity of the profession through the development of knowledge area skills, tools and techniques to achieve success. This would allow students develop competences in accordance to the demands of the industry in which they will perform functions typical of their career. Five key project management core skills and competences were evaluated and responses sought from the respondents as shown in table 3 below. The variables were to establish whether mentorship enabled the development of Project Management study amongst students. Results as shown in table 3 below indicates that majority of respondents agreed that they were satisfied with the level of professional mentorship received and that mentorship enabled development of their project management skills. However, only 21 % and 4.4% respectively had a negative view of the impact of mentorship on their project management skill development. They considered the impact as not very significant.

Table 3: Survey Assessment of Mentorship Application for Project Management students

	As a student of this University I am …	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Q1	Satisfied with the Level of Professional Mentorship	11.4	9.6	26.3	26.3	26.3
Q2	Satisfied with my Experience as a Project Management Student	1.8	2.6	33.3	36.0	26.3

Q3	Satisfied with the Soft skill in human relationship and leadership roles	0.0	1.8	25.4	48.2	24.6
Q4	Satisfied with my ability to analyses complex data	0.9	7.9	32.5	40.4	18.4
Q5	Satisfied with my understanding Project Management tool and Techniques	0.9	6.1	27.2	41.2	24.6
Q6	Satisfied with my ability to Understand Project Management Knowledge Area	2.6	2.6	22.8	40.4	31.6

Source: Field Survey (June, 2018)

Further analysis was carried out using SPSS to determine the reliability of the scalable variables which include several items in the questionnaire administered. SpearmanCorrelation Coefficient, a non-parametric test was used to determines the strength of relationshipbetween the two variables- Project management mentorship and performance of students.

Table 4: Value of Spearman's Correlations

			Graduating or present grade point average(CPGA)	ind1mean
Spearman's rho	Graduating or present grade point average(CPGA)	Correlation Coefficient	1.000	.240**
		Sig. (2-tailed)	.	.001
		N	179	179
	ind1mean	Correlation Coefficient	.240**	1.000
		Sig. (2-tailed)	.001	.
		N	179	179

**. Correlation is significant at the 0.01 level (2-tailed).

Cronbach's alpha was used to measure internal consistency for multiple Likert questions in a survey. From Appendix 1 above has the value at 0.839 which indicates a high level of internal consistency. From the analysis, any scale varies the Cronbach's Alpha from .858 to .782 in each instance.

In continuation, the correlation between the students' performance measured using the cumulative grade point average and Project Management mentorship.

Hypothesis:

H_o: there is no significant positive relationship between student performance and the Level of Professional Mentorship

$H_{1:}$ there is a significant positive relationship between student performance and the Level of Professional Mentorship

Table 4 above indicates that the Spearman coefficient is 0.248 thus indicating significant relationship at 0.01 level (2-tailed test) and suggests the existence of a positive linear relationship between Student performance and the level of professional mentorship.

Conclusion and Recommendations

This research would enable the designing a framework that could serve as a means for ensuring better performance of students through recommended strategic adjustment. These adjustments would include curriculum review that aims at increasing the students' industry contact hours to the bridge the gap of mentorship currently existing between the university and industry. Similarly, improving learning outcomes through effective communication skills and building key knowledge area of Project management study awhile stressing the significance of controlling the performance.

Universities will be required to monitor student performance, which demands extraction of information from students to inform policymakers on ways to improve Student support resources which include mentorship as a tool for strategic development. Mentorship can be used as a policy mechanism designed to promote the career development and advancement in the context of educational administration in the country.

Policy makers should consider the implementation of structured induction programs that successfully inculcate mentorship programme into the new student at the point of initial programme enrolment as doing so would result in decreased attrition and increased retention of students in the study. Management's commitment towards effective implementation of mentorship induction programs for students of project management in the nation's universities should be sustainable for maximum positive impacts on their performance during their study and efficiency in industry on graduation.

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Appendix

Case Processing Summary

		N	%
Cases	Valid	179	100.0
	Excluded[a]	0	.0
	Total	179	100.0

a. List wise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.839	.858	8

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.576	2.240	3.944	1.704	1.761	.314	8
Inter-Item Correlations	.430	.062	.787	.725	12.649	.047	8

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
ind1mean	24.8380	18.519	.985	.	.782
What was your graduating or present grade point average(CPGA)	26.3641	22.321	.247	.	.855

How would you rate the level of professional Mentorship	25.1294	18.638	.403	.	.858
How would you describe your experience as a PM Student	24.7886	18.939	.602	.	.816
How would you describe your soft skills in human relationship and leadership roles	24.6601	20.050	.595	.	.819
How would you describe your ability to analyses complex data	24.9674	18.788	.662	.	.809
How would you describe your understanding PM tools and techniques	24.7942	18.591	.710	.	.803
How would you describe your ability to use PM knowledge areas	24.6881	18.886	.602	.	.816

A DISCOURSE ON THE INNOVATIVE ASSESSMENT TECHNIQUES FOR VALID ASSESSMENT IN EDUCATIONAL INSTITUTIONS IN NIGERIA

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Abstract
Educational assessment has been regarded as part and parcel of teaching and learning right from the time formal education came to existence. There will never be attainment of objectives and goals in education in the absence of assessment in education. This paper reviewed some innovative assessment techniques that can be used to ensure valid assessment of teaching and learning activities in the institution of learning. It also discussed efficacy of Computer-based test as an innovative technique and finally rounded-off with some examples of CATs developed by which contains techniques used in the assessment of classroom instruction. The paper concluded that if these assessment techniques are patronized and judiciously utilized by teachers, there will be improvement in the quality of teaching and learning in schools and assessment will become more valid which by extension will improve the quality of education.

Keywords: Educational Assessment, Innovative Assessment Techniques, Computer-Based Test, ICT, Validity, CATs.

Introduction

Teaching and learning can never be successful in absence of assessment. Which usually gives a hint on how far is the achievement of learning objectives, and at large, achievement of educational goals. Assessment is the bedrock of education because test scores usually derived are used to measure learners' academic strengths and weaknesses. Also societies solely depend on the students' performance to weigh the quality of their respective educational systems and level of goals' attainment (Ojerinde, 2009).

For several decades, assessment in education has been analogue or manual in nature until recently when Information and Communication Technologies (ICTs) were incorporated. The analogue system was not without some problems ranging from inefficiency, insecurity, delay in results production and so on. For example, in Nigeria, one of the most outstanding problem in educational assessment was the production of valid test scores and grades in examinations (Aworanti, 2016). But with the integration and diffusion of ICTs in education, there was evidence of positive reforms in methodologies as the traditional methods of information delivery of information has changed, thereby, offering up-to-date learning experience for both teachers and students (Ololube, Ibogu & Ossai,2007). ICT is defined as as electronic tools for storing and retrieval of information (Matthew, Danjuma Joro & Manasseh, 2015). They are powerful tools that if used correctly, are capable of expanding access to education to workplace and educational quality (assessment inclusive).

Integration of ICT in to education is the use of ICT tools such as computers, internet facilities, mobile technologies, projectors to mention but a few, in teaching and learning and research

activities in the institutions. There is rapid growth of the use of computers in learning institutions particularly in Nigeria nowadays where the trend is relatively new compared to advanced countries like United State of America, China, Japan and others. However, computer literacy is fast increasing in the country by the day.

E-assessment or Computer-Based Test are often used interchangeably to connote the use of computers and other electronic media for assessment. It is also a new development in Nigeria educational system with few examination bodies like Joint Admission and Matriculation Board (JAMB), few Universities embarking on it. The major motive of e-assessment in the country apart from crave to becoming ICT compliant nation was to curb examination malpractices which engulfed the nation for years. Some of the lapses accorded old and analogue system of assessment in educational institutions in Nigeria include delay in producing results of examinations, examination malpractices (Adegbeja, Fakomogbon & Daramola,2012), which contributed tremendously in eroding the nation's quality of education over time.

None the less, regardless, regardless of mode of assessment or testing, the most signinficant psychometric property to be protected in a test is validity. Validity is defined as the degree to which evidences and theories support the interpretation of test scores entailed by proposed use of test (AERA, APA & NCME, 1999). It was also defined as the ability of a test to measure what it is purported for (Kolawale,2010). Thus, any invalid test or assessment is nothing than harm in education and at worst, may lead to invalid decision making concerning test results.

Therefore, this calls for the need to have valid and effective assessment techniques in the institutions of learning as to work smoothly towards achieving educational objectives in the country which will result to national development.

Computer-based Test as an Innovative assessment in Nigeria

As mentioned earlier, e-assessment or computer-based testing is a new development in Nigeria which is even at the moment, undergoing gradual acceptance and implementation in the educational system. In Nigeria, the CBT as an innovation started very recently with few number Universities that were able to partially incorporate it in to their daily assessments or examinations. these includes Federal University of Technology Minna, University of Ilorin, Covenant University Ota, Nigerian Open University of Nigeria (NOUN) and the host of others. (Olawale & Shafii,2018)

Strengths of CBT as a Mode of Assessment

Computer-Based Test as an innovative mode of assessment has been accorded several potentials among which are discussed as follows:

(i) Objectivity, speed and accuracy

One of the most outstanding glory of CBT is accuracy. Computers are highly objective in operations which helps in giving accurate results and operate in a greater speed (Abioye, 2016).This enable institutions of learning and examination bodies to assess large population of test takers within short period of time as against the traditional paper examination that is time consuming and cumbersome.

(ii) Contusive Environment

Computers as electronic machines are usually kept in a conditioned environment for effectiveness and protection. Most of the computer centers have good furniture, air conditioners, light which make the environment conducive for examination. This

benefits testees as it motivates them during assessment. Recently, Statistics revealed that candidates who took part in CBT in 2014 obtained better results compared to the PPT formats (Abioye,2016)

(iii) Cost and Time saving in Large scale examination

Another advantage accorded CBT is cost saving, that is to say it enables assessment of large population of students wishing short period of time using computers which administer and score the test instantly. This eliminate the costs of manual administration, scoring and reporting and also saves time compared to traditional practices. Chua (2012) conducted a comparative study of computer and paper tests, whose results indicated that the CBT mode is more reliable in terms of internal and external validity. Also from the result, the CBT significantly reduced testing time and developed stronger self-efficacy, intrinsic and social testing motivation in the participants.

With the few facts about the advantages of CBT in educational assessment, it is evident that implementing CBT in the institutions of learning will pave way effective and quality assessment as opposed to the traditional system.

Innovative Assessment Techniques (IATs)

Another dimension worthy of giving attention as relates to valid assessment is the innovative assessment techniques. They are strategies in assessment that provide instant information about what learners understand and what they don't (Lee, 2008). One of the unique features of these techniques is that they motivate learners to most especially if consistently integrated in to teaching and learning processes. Though IATs are no used for grading, rather they provide chances for improving learning.

Some of these techniques as analyzed by Lee (2008) are discussed as follows:

(i) **Analysis of Learners Work**: - In this technique, learners are given tasks like assignments, home works, tests, quizzes as usual, after the submission, teachers carefully go through the responses to identify learners' current knowledge, skills and attitudes concerning the subject matter. They also identify strengths and weaknesses of the learners so that proactive measures could be taken. Thus, the issue in this technique is not to allocate grades as it is in the current continues assessment practice, but it also demands seriousness from the teachers as to patiently gather information about learners in the class.

(ii) **3-way Summaries**: - this another astonishing IAT, it involves learners using different modes of attention and thinking, working in a group or isolation. the teacher ask question and instruct the learner to write three different summaries of their responses, for example 10-15, 30-50 and 75-100 words length of summaries at a time. This enriches the learners with abilities or experiences to communicate ideas in minimal wordings.

(iii) **Think-Pair-Share**: - In this technique, teacher asks the learners individually. After coming up with their responses, they are instructed stay in pairs and exchange ideas contained in their responses, and eventually, the teacher circum-navigate the pairs and listens to their discussions. Finally, the teacher shares responses of the pairs to the class. This allows learners to have deep in-sight of subject matters. it also improves learners' self-esteem, self-concept and problem solving skills most especially by the time they heard their views being shared to the entire class.

(iv) **Classroom Polls**: - This has to do with allowing learners to cast their ideas or opinions on certain issues or topics in the class unanimously. This enables learners characterized

to be introverts to express their opinions easily as they find it difficult to speak out. In this method, devices like mobile phones can be used in the class to gather learners' opinions at a time which can be sent to the teachers' phone directly which is speedy and confidential. Much will be gotten from learners using this technique.

(v) **3-2-1 Countdown**: - A very good technique which implies that whenever a learner gains knowledge of something relevant, they tend to utilize it immediately. Thus, teacher gives out some cards demanding information about three things, which are (i) 3- things you didn't know before (ii) 2-things that surprises you about a topic and (iii) 1-thing that you want to start doing with what was learned. This help boosts comprehension and synthetic abilities in learners.

(vi) **strategic Questioning**: - Questioning method is one of the basic learning strategy advocated by an old philosopher, "Socrates". It can be applied to individuals or groups. It involves asking learners higher-order questions to appraise their level of understanding issues or concepts. For example, words like how? Why? Are being used to stimulate in-depth thought among learners which enhances their creative and logical thinking abilities.

(vii) **Around robin charts**: - It is another yielding technique, and it involves grouping learners in to four or five as a group. Each group is given a chart and a marker, and the throws an open-ended (free response) question to the class and expect responses using charts. The chart are later circulated among learners for discussions, and finally the teacher generally discusses the submissions of the groups.

All these centrally concentrate on learners, and they give much information on how and what they learned. Our discussion will now move to the dimension of teachers themselves, in order words, assessment of teaching or instruction.

Assessment of Teaching in the Classroom

Apart from knowing the level of understanding amongst learners, there is also every need to check or assess the quality of instruction may it in the classroom, laboratory, lecture hall or any learning environment. To achieve this, some classroom assessment techniques could also be adopted such as Classroom Assessment Techniques (CATs) developed by Cross and Angelo, (1993) as cited in Faculty Innovation Centre (2018). CATs consists of activities to provide feedback in the course of instruction which will enable teachers assess the quality of teaching generally by pin-pointing strengths and weaknesses instantly for modification and improvement.

CATs has several advantages for both teachers and students. To the teachers, among others it provides frequent feedback that can be reacted to immediately, provides information of what students learn and showcase areas of misconceptions. On the other hand, it hints the students on what they understand and what they do not, help increase their ability to think critically and above all, foster attitudes that value understanding and long-term retention of learned materials.

Examples of CATS

There are several types of CATs which can be used for assessment of the classroom instruction. In this paper, we discussed only three simple ones that can yield good results in the assessment as follows: -

(a) **Written Reflection**: - This is an assessment technique that sometimes referred to as "Minute Papers" or "Muddiest Point". It involves asking some logical questions to the

learners which response will provide true reflection of what they learned, the questions are: -

i. What are the most important thing you learned today?
ii. What important question remained unanswered?
iii. What was the muddiest point in ……..?

After the collation of the responses, it will guide the teacher on the level of understanding of the learners and as well the technique will enhance learners ability to reflect on the major facts of subject matters.

(b) **Start-Stop-Continue**: - This is also another revealing and promising technique of assessment. In the technique, teacher asks learners some questions a teaching is going on that will instantly improve quality of teaching. The questions are:-

i. List one or two things that I, the instructor(teacher) am currently doing that are not working (things that I should STOP doing)
ii. List one or two things that I am currently doing that I should CONTINUE)
iii. List one or two things that I am not currently doing that will be beneficial to me to START doing.

After the assessment, teacher will be guided on his or her strengths and weaknesses as regards teaching and better ways to improve. Consequently, quality of teaching will be enhanced with time provided the technique is practiced by the teachers.

(c) **Suggestion Box**: - This can inform of small wooden, plastic or steel box that can be placed in classes or halls during instruction or be hanged in front of staffrooms or offices after instruction. Teacher asks the students to drop any suggestions, observations, queries and dissatisfaction as regards teaching so that steps can be taken for improvement. This is done unanimously to avoid any threat to students, and the teacher is expected to whole-heartedly accept all observations. This will go a long way to improve the expertise of teachers and solve several problems of teaching and learning, and above all enhance the quality.

Conclusion

Innovation is crucial in every aspect of life as the world is dynamic in nature. It is apparent from this discourse that if techniques of assessment mentioned can be utilized in teaching and learning at all levels of education a lot of problems of poor teaching and performance will solved. In a broader perspective, quality will be enhanced in educational assessment not only in Nigeria but the world entirely.

Recommendations

from the contents so far highlighted, we recommend that:-

- Teachers should implement the formative assessment techniques interchangeably in teaching as to benefit from their potentials
- CBT or e-Assessment should be given much attention to curb examination malpractices and to improve quality and validity of assessments in the institutions of learning.
- To improve quality of teaching, CATs should be adopted by instructors in classroom instruction

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INNOVATIVE ASSESSMENT TECHNIQUES FOR STUDENTS' ACADEMIC PERFORMANCE IN INFORMATION RETRIEVAL SYSTEMS COURSE IN LIT DEPARTMENT, FUT MINNA, NIGERIA

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Abstract
The study investigated the use of innovative assessment techniques for students' academic performance in information retrieval course. Documentary sources (Test scripts, quiz, and record of attendance, class participation as well as examination scripts and approved result) were used to collect and analyze data. Simple tabulation and percentages were used to further analyze data. Results showed that students performed highly in continuous assessment. While the overall performance of students in the examination and the course was above average. It was further revealed that, to help student score A grade, 28 score B grade while C grade was obtained by 8 students. There was no failure in the course. It was concluded that student can be self-reliant after graduation. The study recommended that lecturer handling related courses should explore under innovative techniques to assess student's academic performance.

Keywords: Continuous assessment, Examination, Academic Performance, Undergraduate Students.

Introduction

Educational System all over the world have undergone rapid changes, Nigeria is not exceptional. In Nigeria, there was paradigm shift from 7,5,4, to 6 3 3 4 system of education. Regardless of any of this systems, each is characterized by innovations in teaching and assessment techniques. Today there is a shift from lecture method to electronic method of teaching (Use of projector, PowerPoint, slides) as well as method of assessing teachers competence/level of instructional delivery; student level of understanding of teaching.

The concept of continuous assessment to a lay man understanding is test; and the truth of the matter is that the definition of continuous assessment is the record of student performance from the beginning of teaching a particular course/subject to the end of lecture and before semester, terminal and/or sessional examination.

The current innovative assessment includes but not limited to mid-term test, term paper, quiz, class participation, and attendance, etc. Although these varies from institution to institution and from one level of education to another. The need for continuous assessment of student is spelt out in the National Policy of Education (2013). There are two types of evaluation: formative evaluation and summative evaluation. The former in the assessment which takes place un-termly or monthly basis while, the later takes place at the end of students' program such as oral defense of projects/thesis.

The performance of students at the end of term, semester, session or program largely depend on the cumulative assessment of test, class attendance/participation, quiz term paper and end of term or semester examination which at the end leads to student earning Cumulative Grade Point Average (CGPA) distinction, upper credit, lower credit/lower merit, as the case of diploma program while first class, second class upper and lower, third class and pass degree as the case of universities in Nigeria, although Aji (2018) maintain that academic performance of undergraduate students is usually a function of/to some extent depends on utilization of ICT facilities in university libraries.

Despite emphasis lay on continuous assessment, some teachers consider tests as the only method of assessing students' academic performance and this sometimes lead students' having low level of academic performance in some courses/subjects.

The main objectives of this study is to identify various innovative assessment techniques and undergraduate student's level of performance in LIT 513 (three credit unit) i.e information retrieval systems, a 500 level,3-unit course in the department of Library Information Technology, Federal University of Technology Minna.

Literature Review

Ogunsanwo (2005), conducted a study to find out the differences and relationship between study habits and academic performance of boarding and day students in Ibadan Metropolis. Continuous assessment scores of students in English Language and Mathematics test were used to test the students' academic performance. The scores of each student in two subject in the eight schools within the metropolis were converted to t-scores. The co-efficient of the liability was 0.81 meaning that the study habit instrument (SHI) was discovered to be useful and reliable. (Saka, 2014) reported a positive impact of continuous assessment and examination on the overall academic achievement of 200 level students in Government Document Course in FUT Minna.

Methodology

Documentary analysis of CA records and marked scripts, moderated and approved results were used to collect data. Sorting was done according to the assessment techniques used and marked scripts. Simple calculation involving frequency counts and percentages were used to analyze the data. Though there was anonymous on students' matriculation numbers

Results and Discussion

Table 1: Assessment Techniques

S/N	Matric No.	Class Attendance (5marks)	Quiz/ Part. (5marks)	Group Assign. (10marks)	Test (20marks)	Total score (40marks)
1	XXXX	5	5	9	10	29
2	XXXX	5	5	9	12	31
3	XXXX	5	5	9	10	29
4	XXXX	5	5	9	10	29
5	XXXX	5	5	9	11	30
6	XXXX	5	5	9	10	29
7	XXXX	5	5	9	9	29

8	XXXX	5	5	9	11	30
9	XXXX	5	5	9	10	29
10	XXXX	5	5	9	9	29
11	XXXX	5	5	9	12	31
12	XXXX	5	5	9	10	29
13	XXXX	5	5	9	10	29
14	XXXX	5	5	9	11	30
15	XXXX	5	5	9	11	30
16	XXXX	5	5	9	11	30
17	XXXX	5	5	9	9	28
18	XXXX	5	5	9	12	31
19	XXXX	5	5	9	10	29
20	XXXX	5	5	9	11	30
21	XXXX	5	5	9	10	29
22	XXXX	5	5	9	12	31
23	XXXX	5	5	9	10	29
24	XXXX	5	5	9	10	29
25	XXXX	5	5	9	10	29
26	XXXX	5	5	9	10	29
27	XXXX	5	5	9	11	30
28	XXXX	5	5	9	10	29
29	XXXX	5	5	9	10	29
30	XXXX	5	5	9	10	29
31	XXXX	5	5	9	10	29
32	XXXX	5	5	9	10	29
33	XXXX	5	5	9	10	29
34	XXXX	5	5	9	10	29
35	XXXX	5	5	9	12	31
36	XXXX	5	5	9	10	29
37	XXXX	5	5	9	9	29
38	XXXX	5	5	9	10	29
39	XXXX	5	5	9	9	28
40	XXXX	5	5	9	10	29
41	XXXX	5	5	9	10	29
42	XXXX	5	5	9	8	28
43	XXXX	5	5	9	10	29
44	XXXX	5	5	9	10	30
45	XXXX	5	5	9	10	29
46	XXXX	5	5	9	9	28
47	XXXX	5	5	9	11	30
48	XXXX	5	5	9	10	29

From Table 1 the column on Matric Number was marked XXXX showing anonymity thus the students' Matric Numbers were not shown to consumers of the information in this paper.

Continuous Assessment is not restricted to test above, other yardsticks are used to measure students' academic performance. These yardsticks include: attendance to lectures; class participation, quiz, individual and group assignment, term paper presentation, seminars and test. In FUT Minna the C/A is 40% and is expected to be spread within or some of the above-listed yardsticks for measuring students' academic performance. The writers of this paper who is also the lecturers in the department and teaching the course respectively used the following yardsticks for assessing students' academic performance, thus:

Class attendance	- 5%
Quiz/Class participation	- 5%
Group Assignment	- 10%
Test	- 20%
Total	- 40%

From the Table, all the 48 students met the 75% attendance requirement and each earned the 5% allocated to lecture attendance. The score was generated from the series of attendance taken and contained in the documents titled: "attendance sheet". During each lecture attendance sheet is passed around and roll call taken at the end of lectures. At the end of the course lecture the attendance list are assembled and each student attendance was determined. Series of quiz were administered on students at the beginning middle and end of lectures and is usually 5 minutes the essence of administering quiz is to check regularity of students to lectures, assess students' Intelligent Quotients (IQ) level as well as making learning more permanent on students. Going through the scripts and records of class participation all the 48 students met up the requirements and each earned the 5%. The lecturer assigned/grouped the 48 students into five (5) groups and gave them assignment on "compilation of citation index of SSTE conference proceedings of 2013, 2014, 2015, 2016 and 2017". Each group was assigned a year proceeding and able to meet the requirement by not only compiling the citation index but also type and save the document on Compact Disk (CD). After thorough examination of the documents each group scored 9% out of 10%. Data on the last column showed variations in the mark scores in 20% test among the final year undergraduate students offering the course. The highest score in the test was 12 mark and five (5) students accounted for the highest score. This was followed by eight (8) students with each scoring 11 marks. Six students scored 9 marks and the lowest score of 8 marks was from one student. The observation from the score was that students did not expect question from the aspect of the "type of subject index". This was based on friendly interaction with the students in one of the lectures after the test.

The cumulative C/A result showed that the academic performance of students was highly impressive as the range score was between 28 and 31 marks.

Table 2: Examination Questions and scores

S/N	Questions	Scores by Students
1. Compulsory	a. What do you understand by indexing language and indexing process? b. Show the relationship and area of demarcation between Catalogue and Bibliography c. How can you as a Librarian assist users to search and retrieve information from online database using AND, OR, NOT	$4, 5^{4}, 6^{6}, 7^{7}, 8^{6}, 9^{7}, 10^{15}$, 11, 13 (48 students)

	d. In a pool of the collection of 100 relevant documents, a searcher was able to retrieve 64 of such documents. In another way round, 100 documents were retrieved by the system out of which 89 of them were relevant. i. Calculate the recall ratio and precision ratio ii. What do you understand by Recall ratio and Precision ratio in information retrieval systems? (15 marks)	
2.	In an information-based industry, abstracts and indexes are very crucial to the research needs of users. How can you as a librarian succinctly produce these vital tools so as to meet user's research needs? (15 marks)	1^3, 6^7, 8^2, 9^3, 10^7, 11^{11}, 12^2, (35 students)
3.	With the aid of concrete examples and illustrations, succinctly explain any FIVE (5) types of subject indexes that are produced and used in third world libraries. (15 marks)	7^4, 8^3, 9^7, 10^{10}, 11^5, 12^2, 14 (32 students)
4	a. Create borderlines among Data, Database and Database Management Systems b. Succinctly explain by categorization the databases and database management systems.	4^2, 5, 6^2, 10^9, 11^3, 12^6, 13 (24 students)
5	a. Abstracts serves as mirror to full text and intellectual content of collection in library and information centres depending on their groups/groupings. Critically but in a step-by-step order account for their groupings. (15 marks)	1, 10^3, 12^2 (6 students)
6.	Provide full explanatory notes on the following with special emphasis on their relevancy in the information retrieval systems. a. Boolean operators and OPAC (3 marks) b. National and Trade Bibliography (3 marks) c. Language used in preparing a named search tool (3 marks) d. Indexing coordinate system. (3 marks) 3 marks for good and logical presentation of ideas (15 marks)	3, 4, 7^2, 8^3, 9^2, 10^7, 11 (17 students)

Examination carries 60% and since it is 3-unit course six questions are set and students are expected to four questions. Table 2 was on six examination questions and frequency of scores by students in questions 1,2,3,4,5& 6 respectively. Each question carries 15 marks and that question number 1 is compulsory for all students to answer. The interpretation of the score showed that:

Key

1^3 = 3 students, each score 1 marks
4^2 = 2 students, each score 4 marks
5^4 = 4 students, each score 5 marks
6^2 = 2 students, each score 6 marks
6^{7-}= 7 students, each score 6 marks
8^2 = 2 students, each score 8 marks
8^3 = 3 students, each score 8 marks
8^6 = 6 students, each score 8 marks
9^2 = 2 students, each score 9 marks
9^3 = 3 students, each score 9 marks
9^7 = 7 students, each score 9 marks
10^2 = 2 students, each score 10 marks
10^3 = 3 students, each score 10 marks
10^7 = 7 students, each score 10 marks
10^9 = 9 students, each score 10 marks
10^{10} = 10 students, each score 10 marks
11^{11} = 11 students, each score 11 marks
11^5 = 5 students, each score 11 marks
11^3 = 3 students, each score 11 marks
12^2 = 2 students, each score 12 marks
12^6 = 6 students, each score 12 marks

The overall observation from the table was that the highest mark scored was 14 by one student that answer question 3 which was on five types of subject indexes produced and used by the third world libraries and thus was followed by 13 marks score by two students that answered question numbers 1 and 4 which were on indexing language and processes, catalogue and bibliography, Boolean operators, recall and precision ratio as well as data, database, DBM respectively.

Table 3: Overall Students' Performance in LIT 513 course

Table 3 showed students' cumulative performance in continuous assessment and semester examination of 2017/2018 session.

S/N	Matric No	CA	Exam	Total	Grade	Remark
1	XXXX	29	30	59	C	Passed
2	XXXX	31	58	56	C	Passed
3	XXXX	29	72	74	A	Passed
4	XXXX	20	31	51	C	Passed
5	XXXX	30	31	61	B	Passed
6	XXXX	29	45	74	A	Passed
7	XXXX	28	37	65	B	Passed
8	XXXX	30	42	72	A	Passed
9	XXXX	29	36	65	B	Passed

10	XXXX	29	31	60	B	Passed
11	XXXX	31	47	78	A	Passed
12	XXXX	29	41	70	A	Passed
13	XXXX	29	36	65	B	Passed
14	XXXX	30	40	70	A	Passed
15	XXXX	30	36	66	B	Passed
16	XXXX	30	45	75	A	Passed
17	XXXX	28	34	62	B	Passed
18	XXXX	31	39	70	A	Passed
19	XXXX	29	34	63	B	Passed
20	XXXX	30	42	72	A	Passed
21	XXXX	29	38	67	B	Passed
22	XXXX	31	43	74	A	Passed
23	XXXX	29	26	55	C	Passed
24	XXXX	29	34	63	B	Passed
25	XXXX	29	36	65	B	Passed
26	XXXX	29	28	57	C	Passed
27	XXXX	30	30	60	B	Passed
28	XXXX	29	33	62	B	Passed
29	XXXX	29	31	60	B	Passed
30	XXXX	29	32	61	B	Passed
31	XXXX	29	34	63	B	Passed
32	XXXX	29	36	65	B	Passed
33	XXXX	29	29	58	C	Passed
34	XXXX	29	22	51	C	Passed
35	XXXX	31	43	74	A	Passed
36	XXXX	29	35	64	B	Passed
37	XXXX	29	31	60	B	Passed
38	XXXX	29	39	68	B	Passed
39	XXXX	28	34	62	B	Passed
40	XXXX	29	41	70	A	Passed
41	XXXX	29	34	63	B	Passed
42	XXXX	28	36	64	B	Passed
43	XXXX	29	34	63	B	Passed
44	XXXX	30	31	61	B	Passed
45	XXXX	29	40	69	B	Passed
46	XXXX	28	33	61	B	Passed
47	XXXX	30	27	57	C	Passed
48	XXXX	29	39	68	B	Passed

Grades were based on the consideration of results at department and School Board. Observation from the table showed that the students' performance in both Continuous Assessment (C/A) and examination was encouraging though with exception of a Serial Number (S/N) 2 students, all other 47 students' performance was examination in higher than that of C/A. This may be accounted for high levelof preparation and/or seriousness for examination. The overall performance in LIT513 course showed that 12 students obtained between 70% and

78% i.e. A-grade, while 28 of the students obtained between 60% and 69% i.e. B-grade. The table revealed that eight students obtained C-grade and scores were between 51% and 59% respectively. The summary/analysis of the scores in the Table 4 below.

Table 4: Summary/Analysis of Scores.

Mark Range	Grade	Frequency
70 – 78	A	12
60 – 69	B	28
51 – 59	C	08
Total	A, B, & C	48
	D,E, & F	None

Discussion of Major Findings

From the data analysis of assessment techniques, it was discovered that 48 students in 500 level generally perform high with highest score of 31% and the lowest of 28% out of the total 40% respectively. Student's performance it tests was not encouraging as 5 of them perform below average. The overall findings corroborate that of Ogunsanwo (2005) who discovered the reliability coefficient of 0.81 for secondary school students within Ibadan Metropolis.

On the examination scores in respect to questions answer showed that the overall performance of 500 level students was above average. It is not surprising ass students were able to revive the test scripts and the entire lecture note. This findings is in line with that of Saka (2014), who discovered positive impact of continuous assessment and examination on overall academic achievement of 200 level students in Government Document Course.

Conclusion

With high performance of student in LIT 513, showed that student can perform well no only in labour market but also to be self-reliant after graduation.

Recommendation

Lecturers handling related courses can explore other innovative techniques to assess students' academic performance.

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UNDERSTANDING TEACHER LANGUAGE AND VISUALIZATION PROCESSES IN ADVANCING MATHEMATICAL THINKING IN MULTILINGUAL CLASSES

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ABSTRACT
This paper reports on an aspect of a study that inter alia looked at three purposively selected grade 11 multilingual mathematics teachers' use of verbal language to enhance mathematical thinking during the teaching of geometry and trigonometry. Results of this study showed that teachers in the observed multilingual high school classes mostly used every-day words in both borrowed and transparent forms to promote mathematical thinking. In situations where words or phrases were not immediately available, teachers used illustrations from the learners' environment. This paper concludes that while the use of everyday words, phrases and illustrations has many socio-cultural advantages attached to it, teachers should ensure that accurate mathematization and mathematical thinking are nevertheless prioritized and achieved through such efforts, especially at higher grades of school learning.

Introduction

The learners' ability to think and speak mathematically, and to eventually use mathematical thinking strategies to solve problems in and outside school is one of the key goals of school learning. This thus calls for teacher language use to be cognizant of these salient features of school mathematics teaching. The importance of mathematical thinking as the Centre of scholastic ability (Tall and Vinner, 1981) cannot be overemphasized. During the teaching process, especially in multilingual settings where majority of learners are taught mathematics in a language not their first, use of verbal language to enhance mathematical thinking is important as a way of learning.

The importance of using verbal language to improve learners' access to conceptual understanding of mathematical concepts leading to mathematical thinking processes, is increasingly urgent. Teachers' verbal language is crucial as it is used, among other things, to kindle relevant mental images necessary for understanding mathematics concepts. Language is paramount in triggering mental images necessary for constructing meaning and advancing mathematical thinking. In the teaching and learning of mathematics, without the activation of mental representations, no meaning can be present (Sadoski & Paivio, 2013). Teachers' choice of words, phrases and illustrations both in language of learning and teaching (LOLT) and learners' home language should be used to create meaning thereby making learning possible through advancing mathematical thinking. Teachers' language should thus activate relevant mental images and other representations that will produce meaning during learning. This study looked at the teachers' choice of words and verbal illustrations in home language when teaching mathematics to English second language learners. The interest was to understand how teachers used words and illustrations in learners' first language to enhance mathematical thinking in their learners.

The way in which language is used for stimulating visual images and experiences may transform listeners' different ways of thinking about a given mathematical concept. Such may also conjure up different mental images from which one can abstract different facets of a given

mathematical concept (Davis, Goulding & Suggate, 2017) and advance mathematical thinking. In situations where teaching is done in a language, that is neither the teachers' nor the learners' first, research has repeatedly encouraged the use of learners' second language as a linguistic resource during teaching. In South Africa's many rural and townships schools, mathematics teaching occurs through code switching which is defined as the alternate use of two or more languages in one conversation (Adler, 2001). This study views teachers' incorporation of learners' first language through code switching as a resource available for multilingual teachers and their learners to enhance mathematical thinking, and sought to answer the following questions:

(i) In what do mathematics teachers use learners' first language through code switching to evoke mental pictures that advances mathematical thinking in multilingual classes?
(ii) How do these assist in advancing mathematical thinking during the teaching of mathematics?

BACKGROUND

Teacher verbal language to advance mathematical thinking.

Language plays a fundamental role in the construction of mathematical concepts and advancement of thinking. Teachers' verbal language is crucial as it is used, among other things, to kindle relevant mental images necessary for understanding mathematics concepts and constructing meaning when actual representations are not immediately available. A key feature of mathematical thinking is thinking outside-the-box, which is a valuable ability to survive and operate successfully in today's world. Use of verbal language in learners' first language permits the incorporation of what learners already know thereby aiding thinking and meaningful learning.

Verbal language offers the means to give names to concepts- concept name/definition. Many concepts when meet in mathematics may have been encountered in some form elsewhere in mathematical or non-mathematical situations. Formally defining and/or naming of mathematical concepts may occur later when a complex cognitive structure of a given concept already exists in the mind of an individual. This thus results in yielding a variety of personal mental images when a concept is pronounced. Each concept name or definition has a corresponding or associated concept image or images.

Figure 1: Relationship between concept name and its image

Tall & Vinner (1981) argues:

> We shall use the term concept image to describe the total cognitive structure that is associated with the concept, which includes all the mental pictures and associated properties and processes. It is built up over the years through experiences of all kinds, changing as the individual meets new stimuli and matures. (p. 152).

Sadoski and Paivio (2013) aptly assert that in the teaching and learning of mathematics, without the use or activation of mental representations, no meaning can be achieved. This implies that mathematical thinking may be stifled if mental images are not activated. The concept image box is empty as long as no meaning is associated with concept name (see Figure 1). Choice of words in both the language of learning and teaching (LOLT), and the learners' home language should essentially be used to create meaning thereby making learning possible.

This is because the interplay between the concept name and its image enhances mathematical thinking and understanding (see Figure 2). In addition, verbal language should create and activate appropriate mental images and other representations that will produce meaning during learning. My observations and experiences have shown that the language used to describe a particular concept may actually result in different and often unanticipated understandings of the same concept. For example, the word function one may recall y = f(x), one may visualize a graph of the function, one might think of specific functions linear, quadratic, logarithmic, among others.

As noted by Boaler, Chen, Williams and Cordero (2017),"the problem of mathematics in schools is that it has been presented, for decades, as a subject of numbers and symbols, ignoring the potential of visual mathematics for transforming students' mathematical experiences and developing important brain pathways." (p. 7). I argue that the way language is used for stimulating visual images and experiences may transform learners' different ways of thinking about a given mathematical concept (see Figure 2 below).

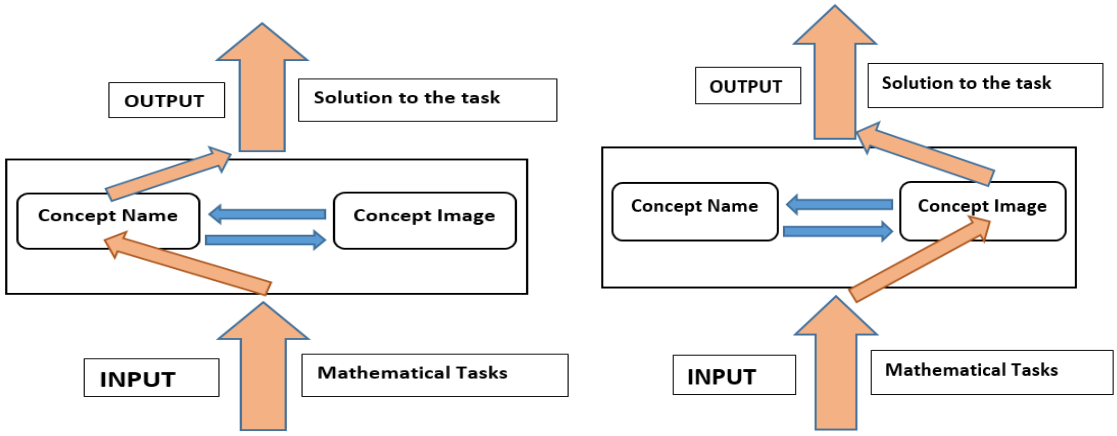

Figure 2: Interplay between concept name and its image (adapted from Tall &Vinner, 1981)

In situations where teaching is done in a language that is neither the teachers' nor the learners' first language, research has repeatedly encouraged the use of learners' second language as a linguistic resource during teaching and, in the context of this presentation, a visual-generating mechanism to illustrate a mathematical idea. A correct concept name will thus evoke a relevant concept name that then in turn assist in advancing meaning making and mathematical thinking.

There are situations when the concept image does not coherently relate to the concept definition, this may result potential conflicts. Tall and Vinner (1981) argues that a more serious type of potential conflict factor is one in the concept image which is at variance not with another part of the concept image but with the formal concept definition itself. Thus to advance thinking, the language chosen to describe, define and represent a concept should not conflict the image associated to that concept. A learner who is presented with images and illustrations that causes cognitive conflict with his concept image may experience difficulties and resultantly hampered mathematical thinking. Teachers who are aware of the possible concept images may deliberately bring incorrect images to the class to arouse discussion and promote mathematical thinking.

In South Africa's many rural and townships schools, mathematics teaching occurs predominantly through code switching. While code-switching is crucial and has benefits, the use of learners' first language through code switching needs to help create appropriate meaning and foster conceptual understanding. In multilingual mathematics classrooms code switching can skillfully, precisely, consistently, purposefully and consciously be used to advance mathematical thinking. One may legitimately ask what concept image is produced by such teacher strategies and also whether the agreed formal concept definitions and descriptions of these concepts are correctly and thoroughly integrated into this image portrayed by teacher language.

Mathematical thinking

Mathematical thinking definition is scarce in literature. Most authors prefer exemplifying it and providing processes embedded in it rather than providing a definition or explanation of it. According to Lutfiyya (1998), "mathematical thinking involves using mathematically rich thinking skills to understand ideas, discover relationships among the ideas, draw or support conditions about the ideas and their relationships and solve problem involving the ideas." (p. 55). Of interest in this definition is the drawing of relationships and making connections. In relation to this is Delvin (2012) who asserts that mathematical thinking, by contrast, is a specific way of thinking about things in the world. Such a perspective emphasizes the importance of using the world around an individual to enhance mathematical thinking. Mathematical thinking is the process of figuring out how to use various mathematical tools at one's disposal to solve any problem (Drijvers, 2015). Thus it is referred to as a life skill by some authors. Borromeo Ferri (2012) rather talks of mathematical thinking styles and explains that "A mathematical thinking style is the way in which an individual prefers to present, to understand and to think through, mathematical facts and connections by certain internal imaginations and/or externalized representations. " Mathematical thinking styles are tied to social contexts in which they are practiced hence the importance of everyday accessories as they are used for meaning making and mathematical purposes.

When speakers use language in everyday contexts to talk about everyday circumstances, they and their listeners, to a greater extent, share a common knowledge of what is being spoken about (Delvin, 2012). Resultantly, that common understanding is often utilized and capitalized in determining the intended meaning. Thus drawing from everyday language and using illustrations from the local environment becomes vital tools to bring a shared understanding which is a prerequisite to promote mathematical thinking. The absence or limited common understanding between the teacher and the learners when using language in mathematics teaching results in lack of understanding. This may be compounded by the paramount need for precision in using mathematical language in mathematical activities.

Mathematical thinking should encourage pupils in multilingual classes to engage mathematical language in reasoning through visualization processes. This is because mathematical thinking maybe looked at as a whole way of looking at things, of stripping them down to their numerical, structural, or logical essentials, and of analyzing the underlying patterns (Delvin, 2012). It thus provides a way of looking at those things that will allow learners to learn from their immediate environment. This results in mathematical thinking allowing teachers to make links between different areas of mathematics, between mathematics and everyday life, and to make connections of various kinds during teaching. Mathematical language can be used to discuss concepts from various domains of the subject. A practical approach using objects from the

pupils' environment can increase their understanding, connection making, motivation and interest. Using a resource not targeted at mathematics specifically encourages pupils to think about mathematics outside of the classroom. But in all this, Devlin (2012) argues that mathematical thinking is thinking and doing like a mathematician. Thus, in all this, preference should be given to mathematization processes when everyday words, phrases and illustrations in learners' first language are used to explain mathematical concepts.

As propounded by Stacey (2006), mathematical thinking is important in three ways: as an important goal of schooling, as a way of learning mathematics, and for teaching mathematics. The ability to think mathematically and to use mathematical thinking to solve problems is an important goal of schooling. Important components of mathematical thinking, include reasoning, modeling and making connections between ideas. It is clear then, that mathematical thinking is important in large measure because it equips students with the ability to use mathematics, and as such is an important outcome of schooling (Stacey, 2006). The use of visualization in the study of mathematics provides English second language learners opportunities to understand mathematical concepts and make connections among them. Teacher language that awaken visual images and visual reasoning is an important component for learning with understanding.

THEORETICAL FRAMEWORK

The challenge for today's mathematics teacher to make learning a meaningful and worthwhile experience for the student is complex especially in multilingual classes where children of diverse linguistic backgrounds and cognitive abilities are taught. This study sought to understand teachers' use of learners' first language through code switching to stimulate and support mathematical thinking. This paper is largely informed by the situated- socio cultural theory as envisaged by Moschkovich (2002), specifically the role of language in classroom communication and cognitive development. Situated in this study means "local, grounded in actual practices and experiences" (Gee, 1999, p. 40)

Central to Moschkovich's situated-sociocultural theory is recognition of the pivotal role played by two or more languages in a given situation as resource to communicate mathematically. The theory describes languages used in a given community as a resource for teaching and multilingualism as a competency in mathematical communication. The situated-sociocultural theory views teaching mathematics as a social activity that employs multiple materials, linguistic and social resources to enhance instruction (Moschkovich, 2002). This theory assumes that mathematics teacher's language practices should be grounded in practice while at the same time connected to mathematical concepts.

The theory also views mathematics learning as participation in a community where learners are taught to mathematize situations, to communicate about these situations and to use resources available to them for mathematizing and communicating (Moschkovich, 2002). One of the major resources learners bring to their learning environment is their home language and everyday life experiences. Moschkovich (2002) asserts that "some of the resources [multilingual] students use to communicate mathematically are gestures, objects, everyday experiences, their first language, code switching, and mathematical representations." (p. 207).

The situated socio cultural perspective was suitable because it allowed this study to consider the teachers' use of non-language resources drawn from the learners' experiences and

environment. Secondly, using a situated–sociocultural perspective, allowed me to ask what teacher mathematical language practices were relevant to the teaching and learning of trigonometry and geometry.

Lastly, a situated–sociocultural perspective helped in opening the way to see competencies more than complexities and associated challenges. Analyzing teachers' language use from the situated-sociocultural perspective, pointed to the way teachers used language resources from the learners' environment to communicate mathematics during teaching. Teachers' making connections of everyday scenarios to mathematical language practices helped the study to widen what counts as competence (Moschkovich, 2002). Teachers' reference to and use of everyday scenarios in learners' language for mathematical purposes was considered a competence.

SAMPLE AND RESEARCH PROCESS

A case study approach was used to enable the researcher gain a detailed understanding of teachers' verbal and visual language practices to foster mathematical thinking during their teaching of multilingual classrooms. Three grade 11 mathematics teachers from three districts in the Eastern Cape Province of South Africa participated in this study. Each teacher and his/her class constituted a case. The three teachers identified as Teacher A, Teacher B and Teacher C were purposively selected. Data were obtained through observing five consecutive geometry or trigonometry lessons per teacher. One interview was conducted with each teacher at the end of the five lessons.

Lesson observations were used to identify language practices of these teachers. With the consent of the Department of Education, school principals and the teachers, lessons were video recorded focusing only on the teacher. At the end of each lesson, each teacher was interviewed. The interviews were following up on language practices teachers demonstrated during the lesson.

The videos were transcribed and analyzed qualitatively. Focus was on verbal language that teachers used to enhance mathematical thinking. Trends and patterns that emerged during teaching were followed up in interviews. Data was then presented and analyzed using the emerging themes.

VALIDITY

The degree to which data collected in the research truly measures that which it is intended to measure is a measure of its validity (Creswell, 2015). Multiple sources of evidence, that is lesson observations and interviews, were used during data collection thereby increasing the validity of the data in this study. Transcriptions were done by an experienced transcriber and were verified by two isiXhosa first language speakers who are English language specialists.

FINDINGS

Teachers' use of everyday words to advance mathematical thinking

This section focusses on some of the words teachers used to help pupils remember concepts or retrieve concepts from their minds that were relevant for solving given tasks.Teachers used such terms drawn from learners' first language to promote mathematical thinking. These are *fumana* and *zoba/ krwela* which were used to formulate classroom tasks and activities.

Fumana

All three teachers used *fumana* extensively to ask questions in this study. *Fumana* is used in everyday life when someone is asked to find something, whether hidden or can be easily picked.In mathematics, *fumana* (find) means using mathematical methods to obtain, locate, detect or gather the values, quantities or any mathematical construct in question. Thus, in situations that needed students to calculate or just to observe and state required answers, *fumana* was used. Below are extracts from their lessons:

Teacher A: Ku-ABD, sizamfumananjani u-BD? (For ABD, how can we find BD?**)**

Teacher A: Now calculate BC. Sizamfumananjani u-BC? (How are we going to calculate BC**?)**

Teacher B*: Cofaecalculatiniyakho, kwi-reference sifumanabani (*use your calculator, what do we get as a reference***).**

Teacher B: S*izawuyifumananjanii-value ka-A there?* (How do we find the value of A there?)

Teacher C*: Xa u multiplier u "b" no "a", surely uzafumana u "ba" (*when you multiply "b" and "a", surely you will get "ba"***).**

The everyday use of *fumana* retains the same meaning as when used for mathematical purposes. All teachers used *fumana* frequently to mean 'calculate', 'find' or 'what we get.' Hence *fumana* has multiple meanings both in everyday use and when used for mathematical purposes. Ability to use everyday words in a mathematical way has advantages of visually bringing an everyday mental picture into the scientific field of teaching. This resultantly assisted in fostering mathematical thinking through connection making. Because *fumana* carries the same meaning in both the everyday life and the mathematical realm, it helped the teacher to make connections. During the interview, Teacher C said, "*everyday terms that have the same meaning when used to teach maths helps link my learners' life outside school with mathematics*." Home language terms with multiple meanings are also important because they can be used in various contexts during teaching. Subsequently, Moschkovich (2002) asserts "because there are multiple meanings for the same term, students who are learning mathematics can be described as learning to use these multiple meanings appropriately." (p. 194). Viewed from such a perspective, use of such isiXhosa terms presented more mathematical advantages rather than limitations.

During the interviews, Teacher B explained what 'undefined' would be translated to in isiXhosa. The term 'undefined' was code switched *ayifumaneki* by Teacher B meaning, 'that which we cannot find or get.' The root word here is still *fumana.*

Researcher: You solved and the gradient was undefined, what is the IsiXhosa term for 'undefined?'

Teacher B: Undefined *ayifumaneki*(you can't get it**)you can't get to the solution. A*yifumaneki*even though they say something is undefined, the thing is there but you cannot define it. Ja it doesn't exist, *ayikhoayifumaneki*(**it's not there you cannot get it***).**

(Interview 2).

The use of *ayifumaneki,* which connects with everyday use, helped to enlighten the concept of an undefined situation. Additionally, *ayifumaneki* was intended to help learners visualize that some situations, like, the gradient of perpendicular line, is undefined. This can also be applied to other cases in mathematics that are undefined or where a solution cannot be calculated or found. Use of familiar words in learners' home language for mathematical purposes may assist learners visualize situations that may not be so easy to understand. Such use also enhances connections necessary for mathematical thinking processes.

***Zoba/ Krwela*Draw/ Sketch**

Furthermore, one of the terms that was used during teaching was*zoba,* the translation for 'draw' or 'sketch'. In everyday life, *zoba* is used when referring specifically to drawing a sketch or a diagram. The term *zoba* has no other meaning unlike the English translation 'draw', which has various meanings depending on the context. Once *zoba* has been pronounced, learners who are isiXhosa first language speakers immediately are compelled to produce a picture or diagram. Using such everyday terms, already familiar to learners, was solely to enhance mathematical thinking and understanding.

Teacher B:*Makazeomnyeazosizobelai-trapezium* (one of you must come and draw a trapezium**).**
Teacher A: U-B *ngu-40,usezantsikomgca*(B is 40, it is below the line**).**
Teacher C: So one full Tan graph *nantsii*-shape *yayo, xauzizobelayonayijonge*(here is the shape**,** when you draw it**).**

Teacher A also used phrase *krwelaumgca* to refer specifically to the drawing of a straight line and not any form of drawing. This phrase requires one to draw only a straight line. The words *umgca* and *komgca*visually suggest and encapsulate a 'line'. Using the two terms exemplifies the teacher's quest to use home language to foster thinking that is mathematical. Teacher A in the extract below required a student to draw a straight line and she ends by saying '*engekhogoso'* meaning 'that is not bent or crooked.' That last part explicitly directs learners to envision and draw a straight line. The language used was more precise and specific, directing learners to the mathematics construct desired. This was done to mentally evoke, expand and probably clarify the idea of straight line.

Teacher A: From B *uyeku*-E *krwelaumgca,*a straight line,*engekhogoso* (Draw a straight line from B to Ethat is not crooked**).**
While these terms were precise and could visually awaken and enlighten what the teacher wanted in enhancing mathematical thinking, they were not used extensively in the lessons during the teaching of geometry and trigonometry. Use of isiXhosa terms through code switching that stimulates visual elements promoting mathematical thinking in line with a concept should be encouraged especially when the majority of learners are being taught in the LOLT they are less proficient.

Isixhosa Names of Mathematical Constructs

In this study, teachers used a combination of borrowed words and indigenous names for various mathematics constructs. For the purposes of this paper, I will consider quadrilaterals and circles.

Quadrilaterals

During the teaching of circle geometry, all teachers briefly looked at quadrilaterals and their properties. This was to prepare learners to tackle cyclic quadrilateral concepts.

Teacher A: *Ikwadrilatheralii-shape enjanikanene*? (What kind of a shape is a quadrilateral?**)**

Teacher B: Talking of a quadrilateral, we mean *ipholigonienamacalaamane, siyavanasonke? Imizekelo includes ikayiti, isikwere, uxande, ipharalellogram* (We mean a polygon with four sides, are we together? Examples include kite, square, rectangle, and parallelogram).

Teacher C: *Jonga forucalaneokwisangqa, all corners should touch i-circumference* (look for the cyclic quadrilateral, all corners should touch the circumference**).**

Use of *ikwadrilatherali* by Teacher A, a borrowing code switching strategy (Chikiwa &Schäfer, 2016), is considered in this study as providing less advantage in advancing mathematical thinking andvisually assisting learners to understand the polygon. This is because the borrowed form is not as explicit and visually vivid as the isiXhosa translation Teacher B used, that is, *amacalaamane* (four-sided). The concept name in borrowed form presents little or no clues to properties of the concept as compared to the isiXhosa translation. Choice of descriptive translations such as these provides a visual image of the type of polygon that is being discussed. This was also noted in Teacher C's reference to the cyclic quadrilateral as *ucalaneokwisangqa* (four-sided inside a circle). The isiXhosa translation used for cyclic quadrilateral combines two familiar words forming another concept name that is visually transparent in nature (see Chikiwa & Schäfer, 2016). Relationship between ideas was promoted by use of learners' first language. This study argues that use of transparent terms helps learners to visualize the concepts because of the immediacy and familiarity of the terms used to isiXhosa first language speakers. This ultimately cascades into promoting mathematical thinking amongst learners who are being taught mathematics in a language not their first.

Circle

During circle geometry lessons, teachers also spent some time looking at the circle and its parts.

Teacher A: *COA yi-diameter yesangqa, ungathinikengokungo-OA, khodiyethu, le-centre of the circle?* (What is the relationship between diameter COA and chord OA, and the center of the circle**)?**

Teacher B: *Ngubanii-centreyethuphayana?Ngubaniumbindiwesangqa*(what is our centre on that one)?

Teacher C: *Rememeberukhuthii- circumference iperimithayesangqa. Or singathiumgamaojikelezeukhuphelakwe-circle.*(Remember that circumference is the perimeter of the circle. Or we can say it's the distance round the circle.)

While all teachers agreed that referring to the circle as *isanqa,* an everyday term,was familiar to all learners, they still alternated between English and isiXhosa translations. Only Teacher B consistently referred to the 'centre of the circle' as*umbindiwesangqa,* meaning 'in the middle of a circle.' I asked Teacher B to explain 'centre of a circle' in isiXhosa and he said*: "Umbindi we-circle, umbindiwesangqa, it means that in the middle. If children are playing, you say yenzaniisangqa(form a circle) and then one person must be embindini(in the middle) just in the middle."* Teacher B thus was drawing from the everyday activities familiar to his learners. Home language is considered in this study as facilitating mathematical thinking through connection

making and showing relationships between concepts. For most key mathematical terms, teachers relied on borrowing rather than using transparent terms during teaching. For example, *yi-diameter, khodi (chord), le-circle, i-perimitha* and *i-circumference*. Teacher C explained circumference in isiXhosa as*umgamaojikelezeukhuphelakwe-circle* (the distance round the circle) and his explanation was considered as promoting mathematical thinking through providing a clear visual picture of what circumference mean. During interviews, when asked to think and provide isiXhosa terms familiar to learners, teachers could do so even with terms that they had continuously borrowed during teaching. If teachers give time to proper planning for use of learners' first language through code switching to promote mathematical thinking in each lesson, this will help improve the use of more familiar and visual language during teaching.

Lack of Isixhosa Terms and Use of Situated Illustrations

In the teaching of geometry and trigonometry, teachers concurred that some mathematical terms were not easy to translate to their home language. In those cases, where the mathematical concept lacked an equivalent word or phrase in isiXhosa, teachers were either using descriptions of those words or they sought illustrations from their pupils' environment. Such language practices where teachers drew from mathematically rich scenarios from learners' environments were perceived as ways of helping learners to visualize and think mathematically.
In the interview, Teacher A explained the acute and obtuse angles using isiXhosa analogies. She concurred that actual names for these terms in isiXhosa were not easy to find hence the use of explanations or descriptions to identify these angles.

Researcher: How do you explain acute, obtuse and reflex angles in isiXhosa?
Teacher A: Mh-h we don't have those words in Xhosa. I use descriptions for example acute angles, *i-angles ezingaphantsi ko-90*^{0} (angles below 90^0 **). Less meaning that *zingaphantsi (***they are below***). I-obtuse*, it means *zingaphezulu ko*-90^0 but *ngaphantsi ko*-180^0 (**Obtuse means more than 90^0 but less than 180^0**)**

(Interview 1).

During interviews, Teacher A could describe promptly acute and obtuse angles in isiXhosa. The illustrations were done in commonly used language familiar to learners. The isiXhosa terms are thus more elaborate and easier to understand for learners than being taught in a second language which is less familiar. This is because they were drawn from their day to day life yet for mathematical purposes. The demonstration below presents a visual picture of the positioning of these angles if they are presented on a number line. A trend that emerged with all participating teachers was their use of code switching for illustrating a point using everyday scenarios. In the interviews, I followed up on this tendency with Teacher B when he was dealing with parallel lines. He gave two everyday examples to illustrate parallel lines, that is, railway lines and lines on a freeway.

R: How do you explain the concept of parallel lines in class using their home language?
Teacher B: I normally relate parallel lines with*iziporo*(railway lines). If you look at *iziporophaku-train* (railway lines for the train), they will never meet even if they are taking a turn they all taking a turn. So basically it's another visual and familiar example of parallel lines. Even *umgwaqolaphaku-freeway*(the freeway roads*)*, your lines that are there on the freeway are also parallel **(Interview 2).**

Teachers in the interviews reiterated the need to tap on locally available everyday visual illustrations that have ability to connect and present visual aspects of mathematical concepts. Teacher C also gave a similar illustration during interviews.

Teacher C: Look at the train, *phai-train mosineziporozibini*(has two rail lines), if those two would try to meet, it would get dangerous and people would die. So those two tracks are parallel. This will give them confidence as you use known visible things around them. **(Interview 2).**

Learners in these classes were familiar with railway lines and highways. Teachers thus suggested that these would be appropriate phrases to use to stimulate the visualisation of parallel lines concept. Both teachers agreed that any scenario where two lines will not meet would be suitable to illustrate parallel lines. Teacher C added that taking visual examples from their immediate environment would boost learners' confidence. Use of such illustrations from everyday life assist learners to internally, visualize embedded mathematics concepts resultantly aligning these to mathematical thinking. These illustrations demonstrate a mathematical way teachers used to show their own understanding of the world.

In the extract below, Teacher C concurred that certain concepts like 'perpendicular' were not easy to explain in the home language except if the teacher uses indigenously developed visual illustrations such as games, songs in isiXhosa or some day-to-day aspects familiar to learners to help them understand the concepts. He cited a song that learners sing outside school that may be used to make the concept of 'perpendicular' more understandable and real to learners. Teacher C agreed that picking scenarios from everyday life would help learners to understand and think in a more mathematical manner.

Researcher: How do you explain the concept 'perpendicular' to your learners?

Teacher C: Uhm, you can relate to an event but not necessarily trying to describe perfectly the word perpendicular. In the olden days there used to be some toy-toy and there was a song there it said 'up the gear 90^0' so people were dancing and then they would show something of 90^0 and then if you look at the leg of somebody it's actually straight but the 90^0 is shown with the other leg. But not to say it is perfect or direct. You can draw an event, an old event to just demonstrate like I've come up with now. To have perfect word to say perpendicular, I really don't think so. But I can just relate a scenario.

(Interview 3).

Teacher C indicated that getting a perfect translation for perpendicular in isiXhosa that would visually represent the concept was not easy. Teacher A when asked the same question during interviews responded as given below:

Teacher A: Ok, err like for instance I can take them to the field *nhe*(right) so that they can observe those corners. Like in the field, a netball field *nhe*(right) they know that there is that err, when you are at the centre there is that pole, and then if you are out, there is that line there and it's a round line there. Then at each corner it's straight, there is 90^0 you know, so there is perpendicular there.

(Interview 2).

Teacher B also responded by suggesting that he would use some examples taken from their classroom. He added that because their classroom is the immediate environment, they can see the actual example.

Teacher B: What I usually tell them in the classroom is to look at the wall and the floor. If the house is well built, the wall is going to be perpendicular to the floor. Except in their location where you will find that the house is going down and the wall, and then I refer to them and say, well if you look at that situation it means the house was not well built. It was not properly built and therefore the wall was not perpendicular to floor. It will be more ideal because it's something that you see and you know. **(Interview 4).**

All the teachers agreed that illustrations that would stimulate visual representations will make the concept clearer and will assist students especially if taken from their immediate environment. This emphasis on inherently socially negotiated examples and illustrations aids learning, mathematical thinking, and knowing as learners engage in activities arising from the socially and culturally immediate world (Lave & Wanger, 1991).In all these visual illustrations, teachers were using isiXhosa to explain concepts to learners. Even during interviews, Teacher A and C explained in isiXhosa. Teacher B however pointed out limitations of some of these examples.

The lack of terms enkindled teachers to use illustrations drawn from the immediate environment that would evoke the visual impressions, show connections and eventually leading to mathematical thinking. These illustrations were taken from students' everyday environments. Teachers used isiXhosa mostly when giving these illustrations and some of these illustrations had their limitations. It was important to understand how mathematics teachers' everyday illustrations were used to provide linguistic resources for mathematical thinking.

Summary and Conclusion

Teachers in this study used everyday vocabulary in learners' first language to help improve learners' mathematical thinking. To these teachers, mathematical thinking was taken as a way of thinking about things in the world, as a way of teaching and of learning (Stacey, 2006). While teachers in this study did not extensively use this practice of using learners' first language words to help evoke mental pictures, they used everyday words, which were familiar to their learners, for mathematical purposes. Teachers in this study did not plan how and when to use learners' first language, it occurred spontaneously. The use of language to visually represent and present mathematical ideas during teaching should be as much planned and a learning process as using verbal language. This thus means that when teachers are planning lessons for English second language learners of mathematics, careful selection of words and phrases that will enhance mathematical thinking should be sought.

Teachers of mathematics, who understands how words can be used to visually stimulate conceptual teaching and mathematical thinking, will be conscious to choose words that utilizes imagery to enhance learning. The upshot of all this is illuminated by Horn (2001) who posits that "when words and visual elements are closely entwined, we create something new and we augment our communal intelligence . . . visual language has the potential for increasing 'human bandwidth'—the capacity to take in, comprehend, and more efficiently synthesize large amounts of new information" (p. 1).

Teachers also used descriptions of mathematical concepts in home language in those situations where they could not find an immediate suitable word. Teachers should utilize visual resources existing in their locality, especially those familiar to their learners to enable these learners to grasp underlying mathematical concepts and learn more effectively. Teachers' of mathematics

should carefully choose their language and illustrations to demonstrate precisely intended mathematical ideas if they cannot bring the actual artifacts.

Teachers' use of illustrations during teaching to elaborate geometry and trigonometry concepts is commendable and should be encouraged. Visualizations in their variety of forms such as diagrams, charts, drawings, pictures, visual language and other ways can help learners grow mathematical thinking skills leading to understanding complex mathematical information. However, these should be well planned for such practices to yield the best results. Ad hoc illustrations may cause cognitive conflicts when the concept image does not match with the concept name/definition. A well-reasoned, sentient and astutely designed visual illustrations mixed with verbal descriptions can yield a much richer and rewarding mathematical thinking environment than only verbal or textual description.

Many studies (Paivio, 2006; Mayer, 2003) show that a combination of words and pictures supports thinking, learning and deepens understanding. This is important because in mathematics classes, some learners are auditory learners, and most are visual learners (Kranzler (1999) in Gangwer, 2016; Presmerg, 1986). Use of language that evokes visual representations helps learners to see what they are learning, since visual learners have difficulty following oral lectures as compared to the verbal learners (Horn, 2001; Mayer, 2003). Such language ultimately may enhance mathematical thinking richer environments. This implies that language choices should be varied to achieve intended results for all mathematics learners in multilingual classes.

While use of everyday words, phrases and illustrations has many socio-cultural advantages attached to it, teachers should ensure that mathematization leading to mathematical thinking, is prioritized and achieved through such efforts. Teachers should be taught to use language so that learners of mathematics will not see it as a 'foreign language' that has nothing to do with day-to-day lives of those learning it. Such is possible when teachers find relevant words and illustrations taken form everyday life that clearly and vividly presents the concerned mathematical concepts and provides mathematically rich learning experiences.

In the grade 11 classes used in this study, mathematics teachers tended to avoid bringing actual concrete visual aids during teaching and favoured verbal and abstract approaches.

Thus, ability to use verbal language that evokes visual images appropriateto a given task is necessary. There is need for providing adequate and appropriate academic language support to teachers of all learners learning mathematics in a language that is not their first. Teachers would need to be trained to harness linguistic resources that evoke mathematically related images from their environment for the improvement of mathematical teaching.

There is a need for much more language and content specific support for both preservice and in-service mathematics teachers of multilingual classes.Such support mechanisms should include topic-specific language demands since each mathematics domain has its own sub-register.There is also needing to explore ways to support teachers of second language learners, both pre-service and in-service, how to better engage and address the needs of multilingual learners in the mathematics classroom.

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EFFECTS OF BRAINSTORMING AND CONCEPT MAPPING INSTRUCTIONAL STRATEGIES ON JUNIOR SECONDARY SCHOOL STUDENTS' SOCIAL STUDIES ACHIEVEMENT AND RETENTION IN NASARAWA STATE

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Abstract
The study used quasi–experimental research design involving the non-randomized pretest, posttest, post posttest control group design. The target population comprised 17,550 (9752 male and 7798 female) JS II students from secondary schools in Nasarawa State for the 2016/2017 academic session. A sample of 195 (111 male and 84 female), JS II students from three public secondary schools in Nasarawa Local Government Area of Nasarawa State was used for the study. Data were collected using Social Studies Achievement Test (SOSAT). The logical consensus of the experts gave 0.88 index of rational validity for the SOSAT and the reliability coefficient of 0.85 was obtained for SOSAT using Kuder Richardson formula (K-R21). Analysis of covariance (ANCOVA) was used to test the hypotheses at 0.5 % level of significance. Results revealed that students taught Social studies using brainstorming and concept mapping strategies achieved higher than those taught using the lecture (convectional) method. Similarly, students taught using the two instructional strategies retained more of what they learnt when compared to the conventional method. It was concluded that brainstorming and concept mapping were more effective in enhancing students' achievement and retention in Social studies than conventional instructional method. The study recommended that Nasarawa State Ministry of Education Science and Technology should formulate policies that would mandate JS Social studies teachers to use brainstorming and concept mapping instructional strategies to enhance students' academic achievement and retention in Social studies.

Keywords: Brainstorming, concept maps, lecture, students' achievement, retention.

Introduction
Social studies is a study of man's interaction with his environment. It exposes learners to how man influences and is being influenced by his environment. According to the Nigerian Education Research and Development Council NERDC (2012), the general objectives of Social studies include: Develop the ability to adapt to changing environment; inculcate national consciousness and national unity; become good citizen, capable of and willing to contribute to the development of the society; and inculcate the right types of values and attitudes. It is in recognition of this that the NERDC (2012) clustered Social studies under religion and national values subjects in the revised version of Junior Secondary Education curriculum.

Despite the noble objectives of Junior Secondary school (JSS) Social studies, the academic achievements of students' at the external examination continue to decline in Nasarawa state. This is evident in the dismal academic achievement recorded in Social Studies by students' who wrote the 2016 Basic Education Certificate Examinations (BECE) conducted by the Nasarawa State Ministry of Education, Science and Technology (NGSMOEST) for JS III. According to NGSMOEST (2016) out of a total of 30,542 candidates that wrote the examinations, only 8,240

candidates, representing 25.31 per cent that obtained credit pass in Social studies. The result, when compared to that of the previous two years, shows a marginal decline in the performance of candidates. For instance, in the 2014 BECE, 32.81 per cent of the candidates obtained credit pass in Social studies. In 2015, the percentage declined to 27.57 percent and further to 25.31 per cent recorded in 2016. The current state of affairs is displeasing and this trend may have contributed to the high rate of moral decadence, kidnapping, assassination, armed robbery and other acts of criminality witnessed in Nasarawa state in recent time.

Students' poor performance over the years has been attributed to teachers' use of inappropriate teaching strategies which make students become passive and have less interaction with each other in doing task (Zakaria, Solfitri, Daud and Abidin, 2012). The NERDC (2012) stipulates in the Junior Secondary Education curriculum the strategies to be used for the teaching and learning of Social studies. These are brainstorming, concept mapping, cooperative, debating, demonstration, discussion, dramatization, field trip, inquiry, role playing, simulation, storytelling and use of resource persons. In spite of the recommended instructional strategies, the teaching and learning of Social studies at JS level in Nasarawa state has continued to be dominated by the use of lecture method. The JS Social studies curriculum cannot be effectively implemented when there is a mismatch between the structure of the curriculum and the mode of implementation.

Brainstorming according to Akinboye (2003), is a group creativity forum for general ideas. In brainstorming, every participant in the group is encouraged to suggest as many ideas as possible. It is particularly a good way of getting bright ideas. In this teaching method, all ideas are given equal credence. Participants are encouraged to let ideas flow freely, building on and improving from previous ideas. No idea, however crazy, should be rejected. It is expected that ideas should be listed exactly as they are expressed on a board or flipchart, or written on pieces of paper. The purpose of listing responses is to collect existing experiences and thoughts. The combination of swiftly generated ideas usually leads to animated and energizing session. Adeyemi and Ajibade (2011) posited that the major purpose of brainstorming as a teaching strategy is to foster and enhance communication skill, help to promote thinking and decision-making skill as well as foster different viewpoints and opinions. According to Nworgu (2012), concept mapping means a diagrammatic representation of concepts using arrows to indicate their relationship in order to represent a new knowledge structure. According to Singh and Moono (2015), there are two features of concept maps that are important in the facilitation of creative thinking: the hierarchical structure that is represented in a good map and the ability to search for and characterize new cross-links. When relationships between Social studies concepts are articulated in linking phrases or words on the connecting lines, there is the possibility that learners may understand it better and their learning could improve.

Academic achievement deals with successful completion of academic task by a student in a school. In other words, it has to do with students' performance in school subjects determined by a score from an achievement test. Retention, according to Ngwoke and Eze (2010), is the process by which a child stores information in his memory for use at a later period. Retention occurs when facts or experiences are stored in the long term memory. Retention enhances effective learning and application of skills.

Sex is one of the variables to be considered in this study. Sex refers to the socially, culturally constructed characteristics roles which are ascribed to male and female in any society

(Erinosho, 2005 and Okeke, 2008). Opre and Opre (2005) stated that sex means broad categories that reflect people's impressions and beliefs about females and males. It refers to a set of categorical beliefs regarding the characteristic attributes of a person (men and women) based on his or her belonging to one of the two sex.

Studies conducted by Adeyemi and Ajibade (2011), Jacob, Joel, Sababa and Ndatuwong, 2016) revealed that brainstorming and concept mapping instructional strategies positively impact on students' achievement in Social studies. It is not known if the same success would be recorded in JS Social studies in Nasarawa State. It is also not certain which of the instructional strategies would be more effective in influencing students' achievement and even retention in JS Social studies in Nasarawa State. Although some researchers such as Jacob, Joel, Sababa and Ndatuwong (2016) have found that there are no significant differences in male-female social studies achievement and retention in Social studies, others such as Adeyemi and Ajibade (2011) have identified sex differences in achievement and retention when taught using brainstorming and concept mapping. It was against this background that the present study examined how the use of brainstorming and concept mapping instructional strategies would affect the JSS students' Social studies achievement in Nasarawa State. The contradictory results on sex informed its inclusion in this study as a moderator variable. Thus, the study explored the effects of sex on students' achievement and retention in Social studies when taught using brainstorming and concept mapping instructional strategies.

Research Questions

The following research questions were raised to guide the study:

(i) What are the mean achievement scores of students taught Social studies using brainstorming and concept mapping?
(ii) What are the mean retention scores of students taught Social studies using brainstorming and concept mapping?
(iii) What are the mean achievement scores of students taught Social studies using brainstorming and concept mapping based on sex disparity?

Research Hypotheses

The following hypotheses were postulated and tested at 0.05 alpha level:

(i) There is no significant difference in the mean achievement scores of students taught Social studies using brainstorming and concept mapping.
(ii) There is no significant difference in the mean retention scores of students taught Social studies using brainstorming and concept mapping.
(iii) There is no significant difference in the mean achievement scores of students taught Social studies using brainstorming and concept mapping based on sex disparity.

Methodology

The study used quasi–experimental research design involving the non-randomized pretest, posttest, post posttest control group design. The target population comprised 17,550 (9752 male and 7798 female) JS II students from public secondary schools in Nasarawa State for the 2016/2017 academic session. A sample of 195, (111 male and 84 female) JS II students from three public secondary schools in Nasarawa Local Government Area of Nasarawa State was used for the study. Out of 195 students sampled, 69 (42 male and 27 female) are in experimental group 1, 56 (30 male and 26 female) are in experimental group 2 and 70 (39 male and 31 female) are in control group respectively. Data were collected using Social Studies

Achievement Test (SOSAT). The logical consensus of the experts gave 0.88 index of rational validity for the SOSAT and the reliability coefficient of 0.85 was obtained for SOSAT using Kuder-Richardson formula (K-R21). Analysis of covariance (ANCOVA) was used to test the hypotheses at 0.5 % level of significance.

Results

Research Question 1: What the mean achievement scores of students taught Social studies using brainstorming and concept mapping?

The pretest and posttest scores of students on SOSAT were used to compute mean and standard deviation as shown in table 1.

Table 1: Descriptive Statistics for Students' Mean Achievement Scores based on three teaching methods

Groups	N	Sum	Mean	Std. Deviation
Exp Group1	128	4404.00	34.4062	20.27738
Exp Group2	118	4318.00	36.5932	25.19437
Control Post	112	2992.00	26.7143	15.26902

Table 1 shows the descriptive statistics for significant difference in the mean achievement scores of students taught Social studies using brainstorming, concept mapping strategies and lecture method as 34.4062, 36.5932 and 26.7143 respectively. The implication of the finding is that the academic achievement of students taught Social studies using brainstorming is slightly less than the academic achievement of those taught using concept mapping. Also, the academic achievement of students taught Social studies using brainstorming and those taught using concept mapping are each higher than the academic achievement of those taught using lecture method.

Research Question 2: What are the mean retention scores of students taught Social studies using brainstorming and concept mapping?

The posttest and post-posttest scores of students on SOSAT were used to compute mean and standard deviation as shown in table 2.

Table 2: Descriptive Statistics for Students' Mean Retention Scores based on three teaching methods

Groups	N	Sum	Mean	Std. Deviation
Exprement1Post	128	7221.00	56.4141	7.70267
Exprement2Post	118	6490.00	55.0000	7.93025
Control Post	112	4398.00	39.2679	4.39488

Table 2 shows the descriptive statistics for significant difference in the mean retention scores of students taught Social studies using brainstorming, concept mapping and lecture method as 56.4141, 55.0000 and 39.2679 respectively. This implies that the mean retention scores of students taught Social studies using brainstorming is slightly higher than the mean retention scores of those taught using concept mapping. Also, the mean retention scores of students

taught Social studies using brainstorming and those taught using concept mapping are each higher than the mean retention scores of those taught using lecture method.

Research Question 3: What are the mean achievement scores of students taught Social studies using brainstorming and concept mapping based on sex disparity?
The pretest and posttest scores of male and female students on SOSAT were used to compute mean and standard deviation as shown in table 3.

Table 3: Descriptive Statistics for Male and Female Students' Mean Achievement Scores based on three teaching methods

Groups	N	Sum	Mean	Std. Deviation
Experiment1male	63	2806.00	44.5397	19.18066
Experiment1female	56	1610.00	43.7500	17.52531
Experiment2male	60	1910.00	31.8333	19.49286
Experiment2female	52	1446.00	30.8077	17.70016
Control male	78	1882.00	24.1282	12.77310
Control female	62	1544.00	24.2032	13.23521

From table 3, the mean achievement score of male (44.5397) is slightly higher that of female (43.7500) experimental 1 (brainstorming). Also the mean achievement score of male (31.8333) in experimental 2 (concept mapping) is not significantly higher than that of female (30.8077). But, the mean achievement scores of both male (24.1282) and female (24.2032) in the control group were statistically the same in the whole number. This implies that brainstorming and concept mapping can significantly improve students' achievement irrespective of sex disparity.

Hypothesis 1: There is no significant difference in the mean achievement scores of students taught Social studies using brainstorming and concept mapping.
To test null hypothesis 1, the mean achievement scores for experimental groups (1 and 2) and control group from pretest and posttest with SOSAT were compared using ANCOVA and the results obtained are presented in Table 4:

Table 4: Summary of ANCOVA for Students' Achievement Scores in SOSAT

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	Experiment 1	38021.956[a]	8	4752.744	39.548	.000
	Experiment 2	33910.272[b]	8	4238.784	116.862	.000
Intercept	Experiment 1	114217.203	1	114217.203	950.422	.000
	Experiment 2	85178.732	1	85178.732	2.3483	.000

Control	Experiment 1	38021.956	8	4752.744	39.548	.000
	Experiment 2	33910.272	8	4238.784	116.862	.000
Error	Experiment 1	12378.044	103	120.175		
	Experiment 2	3735.978	103	36.272		
Total	Experiment 1	172368.000	112			
	Experiment 2	131028.000	112			
Corrected Total	Experiment 1	50400.000	111			
	Experiment 2	37646.250	111			

a. R Squared = .754 (Adjusted R Squared = .735)
b. R Squared = .901 (Adjusted R Squared = .893)

Table 4 shows that there is a significant difference in the mean achievement scores of students taught Social studies using brainstorming and concept mapping F(8, 103) = 116.862; P = 0.000. This suggests a statistically significant difference between the mean achievement scores of students' taught Social studies using brainstorming; those taught using concept mapping and the control group. Thus, the null hypothesis is rejected.

Hypothesis 2: There is no significant difference in the mean retention scores of students taught in Social studies using brainstorming and concept mapping.

Table 5: Summary of ANCOVA for Students' Retention Scores in SOSAT

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	Exp1Post	2.511[a]	1	2.511	.042	.837
	Exp2Post	705.532[b]	1	705.532	11.973	.001
Intercept	Exp1Post	4725.151	1	4725.151	79.773	.000
	Exp2Post	1430.812	1	1430.812	24.280	.000
Control Post	Exp1Post	2.511	1	2.511	.042	.037
	Exp 2Post	705.532	1	705.532	11.973	.001
Error	Exp 1Post	6515.551	110	59.232		
	Exp 2Post	6482.146	110	58.929		
Total	Exp 1Post	374407.000	112			
	Exp 2Post	343572.000	112			
Corrected Total	Exp 1Post	6518.063	111			
	Exp 2Post	7187.679	111			

a. R Squared = .000 (Adjusted R Squared = -.009)
b. R Squared = .098 (Adjusted R Squared = .090)

Table 5 shows that there is a significant difference in the mean retention scores of students taught in Social studies using brainstorming and control group F (1, 110) = .042; P =.037. This suggests a statistically significant difference between the mean retention scores of students' taught Social studies using concept mapping and the control group. Also the mean retention scores of students taught in Social studies using brainstorming and concept mapping. F (1, 110) = 11.973; P =.001. Thus, the null hypothesis is rejected.

Hypothesis 3: There is no significant difference in the mean achievement scores of students taught Social studies using brainstorming and concept mapping based on sex disparity.

Table 6: Test of ANCOVA for Students' Mean Achievement Scores Based on Sex

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	Exp 1male	16707.140[a]	19	879.323	5.313	.000
	Exp 1fem	13886.489[b]	19	730.868	16.590	.000
Intercept	Exp 1male	45.238	1	45.238	.273	.605
	Exp 1female	9.993	1	9.993	.227	.637
Exp 2male	Exp 1male	32.213	1	32.213	.195	.662
	Exp 1female	228.104	1	228.104	5.178	.030
Exp 2female	Exp 1male	6801.968	1	6801.968	41.095	.000
	Exp 1female	910.431	1	910.431	20.666	.000
Control male	Exp 1male	1215.828	5	243.166	1.469	.227
	Exp 1female	43.732	5	8.746	.199	.961
Control female	Exp 1male	202.300	6	33.717	.204	.973
	Exp 1female	23.955	6	3.993	.091	.997
Contrmal* Confel	Exp 1male	254.199	6	42.366	.256	.953
	Exp 1female	63.543	6	10.591	.240	.960
Error	Exp 1male	5296.553	32	165.517		
	Exp 1female	1409.742	32	44.054		
Total	Exp 1male	117808.000	52			
	Exp 1female	53964.000	52			
Corrected Total	Exp 1male	22003.692	51			
	Exp 1female	15296.231	51			

a. R Squared = .759 (Adjusted R Squared = .616)
b. R Squared = .908 (Adjusted R Squared = .853)

Table 6 shows that F (6, 32) = 0.91, P = .997 for brainstorming, F (6, 32) = .256, P = .953 for concept mapping and F (6, 32) = .240 P = .960 for control group. This indicates that the differences between mean achievement scores of male and female students' taught Social studies using brainstorming, those taught using concept mapping and the control group is not statistically significant. Thus, the null hypothesis is not rejected.

Discussion of Findings

The study revealed that the academic achievement of students taught Social studies using brainstorming and concept mapping were significantly higher than those taught using lecture method. This concurs with the findings of Adeyemi and Ajibade (2011) and Jacob, Joel, Sababa and Ndatuwong, (2016) who reported that there was statistically significant difference between the academic achievement of students taught Social studies using brainstorming and those taught using conventional instructional method. Similarly, the study indicated that the academic achievement of students taught Social studies using concept mapping was significantly higher than those taught using lecture instructional method. The result agrees with that of Jacob, Joel, Sababa and Ndatuwong (2016) who found that there was statistically significant difference between the academic achievement of students taught Social studies using concept mapping and those taught using lecture instructional method. The present study however revealed that there was no significant difference between the mean achievement scores of students taught Social studies using brainstorming and those taught using concept mapping. The finding could be attributed to the fact that the use of brainstorming and concept mapping as instructional strategies provided opportunities for JS II Social studies students in experimental groups to engage in critical and reflective thought as well as free flow of ideas. The participatory classes might have enhanced the linking of new concepts with prior schema thereby facilitating meaningful learning. These were not available to the control group. The study also revealed that the mean retention scores of students taught Social studies using brainstorming and those taught using concept mapping were significantly higher than the mean retention scores of those taught using lecture instructional method. This is inconsistent with the findings of Sarı (2010), Yagci (2010) who reported that there was no statistically significant difference between the mean retention scores of students taught using models and those taught using conventional instructional strategy.

Moreover, findings from this study revealed that sex does not significantly affect the mean achievement scores of students' taught Social studies using brainstorming, those taught using concept mapping and those taught using conventional strategies. The finding is in agreement with that of Jacob, Joel, Sababa and Ndatuwong (2016) who found that sex does not significantly affect the academic achievement of students taught Social studies using brainstorming and concept mapping. However, the finding contradicts the finding of Adeyemi and Ajibade (2011) who reported that sex significantly affected the academic achievement of students taught Social studies using brainstorming. The present result could be attributed to the fact that both male and female students' taught Social studies using brainstorming, those taught using concept mapping and those taught using lecture instructional method were taught under a relatively similar instructional condition in their respective groups without bias for sex. The findings also revealed that the differences between mean retention scores of male and female students' taught Social studies using models, those taught using concept mapping and those taught using lecture instructional method was statistically insignificant.

Conclusion

In view of the findings of this study, the following conclusions were drawn: Brainstorming and concept mapping instructional strategies were more effective in enhancing students' achievement and retentive capacity in Social studies than lecture instructional method. The effect of sex on students' achievement and retention when taught Social studies using brainstorming and concept mapping was inconsequential.

Recommendations

Based on the findings of this study, the following are recommended:

(i) The Nasarawa State Ministry of Education, Science and Technology should formulate policies that will mandate JS Social studies teachers to use brainstorming and concept mapping as instructional strategies to enhance the academic achievement and retentive capacity of students in Social studies.

(ii) The Nasarawa state ministry of education, science and technology and its service outlets should organize seminars and workshops for Social studies teachers from time to time to equip them with the pedagogical skills of how to use brainstorming and concept mapping in teaching Social studies.

(iii) Teachers should select and utilize brainstorming and concept mapping as instructional strategies devoid of sex preference in order to eliminate sex related differences in students' achievement in Social studies.

(iv) Teachers should select and utilize brainstorming and concept mapping as instructional strategies without bias based on sex in order to eliminate sex related differences in students' retention in Social studies.

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EFFECT OF IMPROVISED FURNACE ON STUDENTS' ACHIEVEMENT AND INTEREST IN GENERAL METALWORK IN TECHNICAL COLLEGES IN KATSINA STATE

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Abstract

This study was to determine the effect of improvised furnace on students' achievement and interest in General metalwork in Technical Colleges in Katsina State using four topics in General Metalwork that required the use of furnace namely; heat treatment, soldering, forging and foundry. The study adopted quasi-experimental design. It involved the use of experimental group, control group, pre-test – post test design. The population of 160 students from three technical colleges in Katsina state was used for the study. The instrument for data collection was made up of General Metalwork Achievement Test (GMWAT) developed by the researcher. The achievement test consisted of 40-multiple choice items with four options of A-D. The test items were identified and selected from the content of NABTEB syllabus on General Metalwork. Test re-test method was used to establish the reliability of the instrument; the tests yielded 0.86 and 0.70 for the achievement test and interest questionnaire respectively. Three lecturers and one industrial expert in metalwork technology were involved in both face and content validity of the improvised furnace and 40 multiple-choice test items. The results obtained from the test scores were compiled and analyzed using statistical tools such as; percentage, mean, and Analysis of Variance (ANOVA) and Analysis of Covariance (ANCOVA) in answering two research questions and testing two hypotheses at 0.05 level of significance. The teacher constructed furnace had positive effects on students' performance. The difference in achievement between those taught using improvised furnace and those taught using conventional teaching aids was found to be significant at 0.05 levels of significance. Also there was significant difference in interest mean scores. Based on the findings of the study, the researcher recommended that government, technical college principals and the different agencies should provide fund to procure the materials and component for designing and constructing furnace by the teacher for teaching heat treatment in technical colleges in Katsina State. Also, constant power supply, generators, accumulators, soldering iron, solder, anvil, steel vessel, pipes and electric blower should be provided and distributed by the ministry of education to the technical colleges for construction of furnace for effective teaching of soldering and forging in Katsina State.

Introduction

Technical Colleges are regarded as the principal vocational institutions in Nigeria; they give full vocational training to prepare students for entry into various occupations. Technical colleges give technical education that leads to the acquisition of skill and techniques in chosen occupation or profession to enable an individual earn a living which is a major focus of vocational and technical colleges. Technical education is described as result oriented. It bring about technological advancement and aims to provide manpower for employment and provide further training for those already qualified, so that they can keep up with modern working methods (Uwaifo, 2009).

Technical colleges offered courses in various trades such as block laying, bricks laying and concreting, motor vehicle mechanics (MVM), radio and television, electrical electronics, carpentry and joinery and welding and fabrication among others. General Metalwork as a course is been offered among Engineering trades such as MVM, Mechanical Engineering craft practice, Welding and fabrication craft practiced. General Metalwork (GMW) consists of topics and sub-topics relevant to these trades such as: heat treatment, soldering, foundry and forging. These aspects of the courses can be successfully delivered using furnace.

Furnace is a device used for heating and melting metals for industrial use (Yusuf, 2013). Examples of furnace are blast furnace, electric furnace, basic oxygen furnace and open hearth furnace. Their heating sources could be coal, charcoal, gas or electricity. It therefore follows that without a functional furnace, and it will be difficult for the teacher to develop the students' skills in metal related work. Furnaces may be obtained in capacities ranging from small ones with a chamber measuring about 150 mm wide x 100 mm high x 200 mm deep, suitable for small tools, to huge structures of about 10 metres long for heat-treating large bars and forgings. Studies conducted by several authors such as: Ogundu, (2015), Onaga, (2014), Mbata, (2010) revealed that in most technical colleges particularly in Katsina state this important teaching aids has not been available for instruction. Therefore, teaching heat treatment, soldering, foundry and forging in a workshop without functional furnace is a challenge to the teacher. The teacher's positive response to the challenge is shown by the extent of improvisation made towards effective instruction. One of such improvisation by the teacher is the improvised furnace. The use of this improvised furnace may lead to improved achievement of students in General Metalwork.

Achievement can be described as a measure of the ability of students to gain or reach a set goal through effort and skill. According to Ogbu, (2016) achievement in education specifically refers to students' success in learning specified curriculum content. Ogbu, explained that a paper and pencil test, called achievement test, set specifically to cover the taught curriculum content, is usually involved. Achievement test is concerned with measuring what a candidate has learned (Olatoye&Aderogba, 2011). In other words, it measures amount of knowledge acquired after learning process. The test measures the gains of educational programmes; what a student has acquired from the process of learning. When achievement is below expectation, it is referred to as poor achievement or under-achievement, which in most cases is usually a product of inadequate teaching methods and students' lack of interest in learning.

Interest is a persisting tendency to pay attention and enjoy some activity or content. Adeyemo, (2005) defined interest as emotionally oriented behavioral trait which determines a student's vim and vigor in tackling educational programmes or other activities. Chukwu, (2013) opined that, interest is an activity or object that can be sustained depending on what an individual whose interest is engaged stand to gain or lose by so doing. Interest is an important variable in learning Elementary Structural Design because when students are interested in an activity, they are likely to achieve highly in that activity and learned facts retained. Hence, learning is strictly an individualized act and process (Nworgu, 2015). It is the learners who must be interested and engaged for learning to occur. The learner is the one who must make the commitment to learn for learning to be meaningful (authentic). In other words, the gears of teaching must engage the cogs of learning (Oranu, 2016). Lack of interest in Elementary Structural Design class therefore inhabits learning and retention.

The use of this instructional aid by the teacher may likely affect the student's achievement and interest in areas of skill development and passing of their examination. According to Ndukwe (2016), at the end of the approved period of study, Technical College students take various examinations, particularly, the National Technical Certificate Examination. National Business and Technical Examination Board (NABTEB 2017) reported that there is a decline in student's achievement, retention and interest in General Metalwork. The document showed that students' achievement and interest in General Metalwork in Technical Colleges have been dwindling in recent time and the situation calls for immediate attention in the Technical Colleges. FME (2017) maintain that Technical Colleges are expected to produce craftsmen. In the last decade, Technical Colleges have recorded high failure rate of over 60 per cent in National Business and Technical Examination Board (NABTEB). It is also on record (NABTEB, 2017) from the Chief examiners reports that the General Metalwork students who sat for the examination performed very poorly.

Furthermore, NABTEB examination conducted on General Metalwork in May/June, 2017 recorded 30 per cent failure in questions on sheet metal practice, 60 per cent failure in forging and 65 per cent failure in foundry (NABTEB, 2016) The National Business and Technical Education Board (NABTEB, 2016) grade distribution from 2015-2016 May/June result revealed failure of 46 per cent for the students who sat for the examination in General Metalwork. The results also revealed unsatisfactory achievement and retention of the students in questions bordering on heat treatment and soldering with failure rate of 42.5 and 45.5 per cent respectively. This is an indication of overall achievement, retention and interest of candidates achieving below average during the examinations. It has been observed by NABTEB (2016) that the persistent poor achievement, retention and interest emanates mainly from the inappropriate teaching methods and instructional aids adopted by technical teachers. Moreover, NABTEB (2017) added that only 2 percent of the total students that were enrolled for the examination in General Metalwork attempted question on use of furnaces which they performed poorly.

Ideally, General Metalwork should be taught using the same equipment the practitioners are using in the field, because teaching General Metalwork involves the study of industrial technology. It therefore requires industrial facilities that include machinery or simulated industrial setting known as workshop. This workshop must have amongst other equipment functional furnaces which are not available for teaching in technical colleges in Katsina state as such teachers use conventional teaching aids such as drawing, pictures of furnace. Hence, the researcher seeks to investigate the effects of improvised furnace on students' achievement and interest in General Metalwork in Technical Colleges in Katsina state, Nigeria.

Statement of the Problem

In technical colleges, students are educated theoretically and practically to make them employable in commerce and industry or any type of enterprises that requires the use of tools and machinery for the operation, production, preservation and distribution of goods and services (Joshua, 2012). For effective practical, instructional aids are made available for learning of the students such as furnaces where necessary. But lack of functional furnace may have contributed to the students' poor exposure to practical classes which is a major problem in Katsina State Technical colleges. There is lack of functional furnace in Katsina State Technical Colleges. Even where furnaces are available, the high voltage electricity needed to power it is not reliable. Lack of functional furnace has possibly led to poor achievement, retention and interest of the students in external examination such as National Business and Technical

Examination. Candidates performed poorly because, according to the report from NABTEB Exam Ethics project (2017), students were unable to attempt questions on blacksmith shop equipment and other equipment for General Metalwork which contributed to poor achievement of students in General Metalwork. It therefore become necessary to find out what effect improvised furnace will have on students' achievement and interest in General Metalwork in Technical Colleges in Katsina state, Nigeria.

Aim and Objectives of the Study

Specifically, the objectives of the study determined:

(i) Effect of improvised furnace on students' achievement in General Metalwork in Technical Colleges in Katsina state, Nigeria.

(ii) Effect of improvised furnace on student's interest in General Metalwork in Technical Colleges in Katsina state, Nigeria.

Research Questions

The following research questions guided this study:

(i) What is the effect of improvised furnace on student's achievement in General Metalwork in Katsina State?

(ii) What is the effect of improvised furnace on student's interest in General Metalwork in Katsina State?

Research Hypotheses

The following null hypotheses were formulated and will be tested at 0.05 levels of significance:

HO_1: There is no significant difference in the mean achievement of Technical College students taught General Metalwork using improvised furnace and those taught with conventional teaching aids in Katsina State.

HO_2: There is no significant difference in the mean interest of Technical College students taught General Metalwork using improvised furnace and those taught with conventional teaching aids in Katsina State.

Methodology

This study adopted quasi-experimental research design. Quasi- experimental design involved the use of pre-test and post-test design with experimental and control groups. This design implies that intact classes was used for the study and that this experimental design helps in controlling almost all the threats to internal validity of an experiment especially in education. This design was necessary because it will not be possible for the researcher to randomly sample the students and assign them to groups without disrupting the normal academic programme of the Technical Colleges involved in the study.

The population of the study comprises 160 final year students of the three Colleges offering General Metalwork. Final year students were used because topics that required the use of furnace are in Technical College III scheme of work.

The population of 160 students is manageable, hence was used for the study. However, selection of the Technical Colleges into the experimental and control groups was carried out using the simple random sampling techniques. Random sampling was also used to select the students for Experimental and Control. In each of the schools, students were grouped into Experimental and Control group which is shown in the table below.

The improvised furnace was constructed following these steps:

(i) The improvised furnace is an improvised teaching material that is made up of sheet metal, folded and twisted sheet metal, blower, 1.5mm plate, angle iron, socket, plat bar and screw. The body is made up of steel plate with sheet twisted round; the steel is hardened with carbon molybdenum of ratio 0.25 percent, 0.70 percent respectively. It is lined with welded angle iron ½ inches and is fired with charcoal using an electric blower connected to a low voltage generator.

(ii) The National Business and Technical Examination Board Syllabus in General Metalwork was carefully analyzed to determine which aspects of the syllabus require the use of furnace in teaching. After the content areas have been identified, the specific tasks requiring the furnace were identified such as heat treatment, soldering, forging and foundry.

The instrument for data collection was General Metalwork Achievement Test (GMWAT) developed by the researcher. 40 test items was used which cover four modules as follows: heat treatment, soldering, forging and foundry as contained in the National Business and Technical Examination Board (NABTEB) syllabus, see appendices B and C for details.

The researcher, in developing GMWAT, prepared a table of specification/test blue print to guide the development of the test items. The construction of the test blue print was guided by the Technical College (NABTEB) syllabus for final year students. The content determined the number of test items on a particular topic, objectives and number of tasks stipulated in the objectives of the syllabus. The test blue print was sub-divided into content dimension contained in the units taught in the study while the ability process dimension were sub-divided into knowledge, comprehension and application of knowledge. The number of test items in each of the syllabus section reflected the relative importance of the different activities and remarks highlighted in the objectives. Summarily, a total of 40 test items were developed and selected to reflect the specification in the blue print.

The GMWAT consists of items with four optional questions A-D as possible answer to each question raised. The students were required to indicate the correct answer by ticking the right answer corresponding to the questions. Only one option is the correct answer from the option A-D. The test was in two sections in which the students are expected to respond to, these include: section A design to obtain information about student school, class and gender. Section B reveals information on the student cognitive level based on the learned contents. The student were given 2.5marks for each of the correctly answered question but was later converted to percentage.

The researcher was subjected the test items for the study to both face and content validation. The face validation was done to determine if the questions are suitable enough for the students and where anyone question is not suitable and noted by the validators, it was replaced. The content validation was done with the use of item analysis to determine if the content of the subject area is adequately covered to determine the cognitive strength of the student and corrections was made where necessary. The test item was validated by a total of three lecturers who teach Metalwork Technology in tertiary institutions; two from Federal University of Technology Minna, one industrial expert from Dana Steel Rolling Mill Katsina. They checked the content of the instrument and lesson plan against NABTEB syllabus in General Metalwork and they observed the test instrument if actually complying with the content of the study.

The test re- test method was used to establish the reliability (the measure of stability) of the instrument items. The GMWAT test item was administered on 24 final year students in General Metalwork in Technical College Dawakin Tofa Kano State. The school has two arms (A&B). Class A was used as experimental group and was taught with the improvised furnace while B was used as control group and teaching aids such as drawings and pictures were used as conventional teaching aids. At the end of the teaching exercise, the objective test was administered and the scores recorded and computed. The second test was administered after three weeks of the administration of the first test. KR 21 was used in analyzing the data and the tests yielded reliability index of 0.86 which shows that the test instrument is suitable the research. The reliability coefficient of interest questionnaire was 0.70 which shows that the Interest Questionnaire was suitable for this study.

The conduct of the study took place during the normal school lesson periods, following the normal timetable in each school. The regular teachers in each school taught their classes. Prior to the commencement of the lesson, the test items was administered as pre-test to both the treatment and control groups on the first day.

The teaching started from the second day. During the lessons the teachers taught the experimental group using furnace, adhering strictly to the lesson procedures prepared by the researcher. The control group was taught the same General Metalwork topics using conventional teaching aids. As the lessons were going on, the researcher used the General Metalwork teachers as research assistants to assist in supervising the use of improvised furnace. At the end of teaching each topic, the post-test was administered to the two groups and the scores were recorded. The field work lasted for eight weeks from when the furnace was constructed.

This study has two research questions and two hypotheses. The research questions were answered by comparing the mean difference between the pretest and posttest of each group of experimental and control groups. The null hypotheses were tested using inferential statistics. The pretest was tested using ANOVA and when it was significant, ANCOVA was used to analyze the hypotheses at 0.05 level of significance using Statistical Package for Social Sciences (SPSS) version 20.

Results and Discussion

ANOVA analysis of pretest scores of the three groups was carried out and ANCOVA was used to analyze the posttest scores in two hypotheses

HO_1: There is no significant difference in the mean achievement scores of Technical College students taught General Metalwork using improvised furnace and those taught with conventional teaching aids in Katsina State.

Table 1: Summary of Analysis of Covariance (ANCOVA) of Mean Achievement Scores of Experimental Group and the Control Group

Source	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	13148.863[a]	2	6574.431	83.474	.000
Intercept	44171.765	1	44171.765	560.840	.000
Covariate (Pretest)	723.750	1	723.750	9.189	.003
Main Effect (Treatment)	10515.766	1	10515.766	133.516	.000
Error	24966.937	157	78.760		
Total	1287116.000	160			
Corrected Total	38115.800	159			

*: Significant at 0.05 levels

Table 1 showed the ANCOVA result of the comparison of posttest scores of students in Experimental Group and the Control Group. An examination of the Table shows ($F_{(1, 159)} = 133.516$, $p < 0.05$). On the basis of this, hypothesis one was rejected. Therefore, there was significant difference in the achievement of students taught General Metalwork using Improvised Furnace and those taught using conventional teaching aids. This implies that Improvised Furnace enhances academic achievement of students better that conventional teaching aids.

HO_2: There is no significant difference in the mean interest scores of Technical College students taught General Metalwork using improvised furnace and those taught with conventional teaching aids in Katsina State.

Table 2: Summary of Analysis of Covariance (ANCOVA) of Mean Interest Scores of Experimental Group and the Control Group

Source	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	611.130[a]	2	305.565	15.737	.000
Intercept	14977.980	1	14977.980	771.403	.000
Covariate (Pretest)	8.876	1	8.876	.457	.499
Main Effect (Treatment)	249.441	1	249.441	12.847	.000
Error	6155.042	157	19.417		
Total	2506895.000	160			
Corrected Total	6766.172	159			

*: Significant at 0.05 levels

Table 2 showed the ANCOVA result of the comparison of posttest scores of students in Experimental Group and the Control Group. An examination of the Table shows ($F_{(1, 159)} = 12.847$, $p < 0.05$). On the basis of this, hypothesis three was rejected. Therefore, there was significant difference in the mean interest scores of students taught General

Metalwork using Improvised Furnace and those taught using conventional teaching aids. This implies that Improvised Furnace increases students' interest in General Metalwork.

Discussion of Results

The finding above was supported by Ogundu (2015) who found out that improvised furnace had positive effects on students' performance in heat treatment. In the same vein, it corroborates the finding of Ogundu (2012) who said that inadequate supply of equipment affected effective workshop operations at a moderate extent; though the groups' (teacher's and students') perspectives on the inadequate supply of equipment differed significantly and that inadequate supply of equipment affect the students' academic achievement. The finding also corroborates the finding of Mandor (2014) who observed that effects of constructivist based circuits on acquisition of vocational and science process skills among junior secondary schools are as follows: (i) the involvement in the classroom caused the students to acquire science process skills easily, making understanding of science concept easier and learning become less difficult. (ii) The learning, understanding of vocational and science concepts did not depend on the type of schools or gender but the total involvement of the students in the classroom. Also that students taught with circuit had higher achievement and retain the concept better than students taught without circuits.

The finding above is supported by Okafor (2010) carried out a study on administrative and teaching strategies for increasing the interest of Senior Secondary School students in technical drawing and discovered administrative strategies needed to increase students' interest in Technical Drawing include among others: a better teaching technique for Technical Drawing teachers by the subject head; retention of good and experienced Technical Drawing teachers in schools by preventing frequent transfer by the ministry and the use of appropriate evaluation methods.

Conclusion

From the findings of this study, it can be concluded that Improvised Furnace enhances academic achievement of students better that conventional teaching aids and their interest was improved towards General Metalwork. The study has provided an additional literature to the existing body of knowledge in the use of Improvised furnace. This provides an empirical evidence for the use of Improvised Furnace for teaching technical colleges students in Nigeria. This study has strong implication for teaching and learning processes in Nigeria technical colleges as made evident in the findings of the study.

Recommendations

Based on the major findings of this study, the following recommendations were made:

(i) Teachers should endeavour to adapt and utilize Improvised furnace for teaching in technical colleges.

(ii) Government, technical college principals and the different agencies should provide fund to procure the materials and component for designing and constructing furnace by the teacher for teaching heat treatment in technical colleges in Katsina State.

(iii) Also constant power supply, generators, accumulators, soldering iron, solder, anvil, steel vessel, sheet metal and electric blower should be provided and distributed by the ministry of education to the technical colleges for construction of furnace for effective teaching of soldering and forging in Katsina State.

(iv) The industries, government, non-governmental agencies and private enterprises and communities should provide components, consumable materials necessary for teaching foundry and supply the materials directly to the individual technical colleges in Katsina State.

(v) Government and curriculum developers should embrace student-centred learning approach in teaching and learning process so that instructional package like Improvised furnace will be aware by various stakeholders in education.

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A CONCEPTUAL PROCESS MODEL TO IMPROVE VOTERS PARTICIPATION IN NIGERIA ELECTION

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Abstract
The level of insecurity in Nigeria election has become more alarming as the increasing rate of political violence such as threats to one's life, disruption of electoral processes and alteration of election results causes the citizens to question the transparency and trust of elections conducted in Nigeria at all levels. Insecurity at every polling unit is one of the major reason why the number of voters participating in an election is continuously on the decrease. For example, results obtained from past elections in Nigeria shows that there is reduction in voting participation. The average voting participation for the presidential election were 57.49%, 54.07% and 43.65% in the years 2007, 2011, and 2015 respectively. This paper focuses on designing a process model that will minimize associated problems encountered during elections and to ensure higher voters turnout. The model is built with the concept of Unstructured Supplementary Service Data (USSD).The deployment of the system will encourage eligible voters turnout and minimize the degree of rigging, human labor, loss of lives and the overall voting time.

Introduction

In Nigeria, results of elections come in two separate columns. One records the votes cast at the polling stations the other, the number of people killed around the time of election; as violence is an integral part of Nigerian politics. Since independence, elections have come to depict chaos, violence, and confusion in Nigerian society. According to Human Right Watch, over 800 people were killed in 2011 presidential post-election violence. The bad consequences of election constituted quite significant fraction of the several remote and real factors that had threatened the corporate existence of Nigeria. According to Ganiyu et al. (2015), the integrity of democracy itself depends on the integrity of the election process. As such, any election process that should be developed need to be adequately robust in order to be able to withstand several manipulative or fraudulent activities. It implies that, there should be high degree of transparency and comprehension in the process which will lead to a great degree of acceptance of the election results. Several kinds of voting structures, processes and systems has been developed and adopted around the globe in an effort to improve the voting participation. However, each one comes with its peculiar challenge which has made the traditional/conventional method (the use of ballot papers to cast vote physically) to still be the most commonly used method of voting in developed and developing nations. Though considerations is given for some electronic alternative (Olusola et al., 2012).

In view of this, a conceptual process model is to be developed based on the existing conventional method using the Unstructured Supplementary Service Data (USSD) which will go a long way (when implemented and deployed) to reduce to the lowest level if not all the problems associated with the Nigeria election as well as improve voting participation.

The Unstructured Supplementary Service Data (Ussd)

Unstructured Supplementary Service Data (USSD) is a global system for mobile (GSM) communication technology used for communication between mobile phone and an application program running in a GSM network and sometimes including programs running in the internet. It a kind of messaging service that is highly cost effective. It is a session-based protocol capable of supporting interactive menu based applications by creating a real time connection. It uses an open standard protocol known as "*Short Message Peer-to-Peer protocol*" (SMPP) in which two devices (termed as peers) are connected in real-time for communication. The SMPP protocol is used for real-time connection which allows third party application to communicate as well. The connections are created using quick codes which feeds back with a quick response and terminates within a period of given time. USSD codes are simple to use. The code is made up of asterisk (*) followed by combinations of digits (0 to 9) .This digits can be separated with additional (*) and ends with a hash (#) key. For instance, when accessing Guaranty Trust Bank application using USSD, the code *737# will give one access to it. The asterisk (*) and hash (#) codes usually are used to signify the beginning and end of the request(Thiga et al., 2013, Wikedzi et al., 2014, Date et al., 2017)

PROBLEM STATEMENT

Since the inception of election in Nigeria it has been the "*Open Balloting System*" which has been adopted as a means of casting votes. Although over the years the security of the voting system has been improved. For instance, in the 2015 elections, the verification machine was introduced that verifies and authenticate a voter via the voter card. Despite this improvements, there were problems such as poor picture quality on a person voter's card which led to poor biometric verification, high rate of rejection of fingerprints during either biometric capture or accreditation process(Shuaibu et al., 2017). Besides all these, the fear and the threat of the unknown at polling units has been a thing of a concern to the citizens. Elections rigging, missing ballots, and the aftermath of the election scares many voters away from the poling units. The unavailability of Internet accessible devices such as smartphones in the rural areas makes it difficult to adopt an online voting system.

The use of USSD can greatly increase and encourage voter's participation in the election while minimizing the posed problems greatly to a reasonable degree. One will not need a smartphone or need to have data in the phone before casting a vote. As long as one has a phone, casting a vote becomes possible.

As such, this research paper aims to design a conceptual process model that will use USSD technology to conduct elections in Nigeria.

SCOPE AND LIMITATIONS

The research paper will focus on developing only a conceptual process model and not an application. The USSD technology will be embedded in the framework.

The following assumptions are considered in the development of the framework:

- An eligible voter must have a Bank Verification Number (BVN) which captures his/her active phone number and Voter Identification Number (VIN) during BVN registration.
- It is also assumed that at the point of BVN registration, each voter's age is appropriately captured to avoid under age voting.
- There is no network problems.

The USSD technology will take care of features such as security of each session initiated, guaranteeing the completion of a session when a user initiates.

One central database (DB) system.

SIGNIFICANCE OF THE RESEARCH

On implementation and deployment of the system, each vote cast will count and the threat to one's life is eliminated. This in turn will increase participation in any given election.

BACKGROUND OF ELECTIONS IN NIGERIA

The history of Nigeria Election can be traced long time before independence when the first election was conducted that brought Dr Nnamdi Azikiwe, Chief Obafemi Awolowo and Sir Ahmadu Bello in 1959.In 1960 the Federal Electoral Commission (FEC) was established and it conducted the immediate post-independence federal and regional elections of 1964 and 1965 respectively. Federal Electoral Commission (FEDECO) was commission by General Olusegun Obasanjo to replace FEC after it was dissolved in 1978. FEDECO organized the elections of 1979, which ushered in the Second Republic under the leadership of Alhaji Shehu Shagari. General Sani Abacha who was the then Military head of states established the National Electoral Commission of Nigeria (NECON)which also conducted Local Government councils and National Assembly elections. General Abdulsalam Abubakar dissolved NECON in 1998 and established the Independent National Electoral Commission (INEC). INEC organized all transitional elections that ushered in the 4th republic on May 29 1999 and since then it has remain the only body responsible for conducting election at all levels from federal, state and local government across the 36 states including Abuja the federal capital territory of Nigeria(INEC, 2018).

TYPES OF BALLOTING

Balloting is a process of casting votes through the use of ballots. Ballots are devices used to cast votes in an election, it may be in form of a paper either big or small used in a secret voting where each voter is allowed to use only one ballot for each of the election. The two types of balloting are open ballot and secret ballot system.

SOME EXISTING WORKS USING USSD

Nyamtiga et al. (2013)proposed a "*security frame work for USSD and compared the security issues between Short Messaging Service and USSD*". The author suggested that USSD messages should be masked and encrypted before sending them. Thiga et al. (2013) presented a proposal with a title called "*An SMS and USSD Model for Location based Mobile Advertising*". Here instead of using GPS, Bluetooth, Java Apps and so on which have their limitations, USSD in conjunction with SMS can be used to track the locations for advertisements. Wikedzi et al. (2014) proposed a "*System Analysis and Design for integrated sponsored SMS/USSD Based M-Services"*. It is a model designed proposal that provide a cheaper alternative on how to vast majority of people can access mobile services with no or little cost implications.

DESCRIPTION OF THE EXISTING SYSTEM

The existing approach of voting system in the country is costly to maintain and laborious as well and also the percentage accuracy is relatively low(Aziken et al., 2017). This is because lots of human effort is involved and paper work in which series of channels are involved during the collation process as such lots of iterations are made either directly or indirectly.

Opara (2015)in a publication on Vanguard News described the step by step process for voting in Nigeria. Based on the step by step process, the existing system framework was developed shown in Fig. 1.1. A voter goes for accreditation where he/she is verified for voting. If the voter

could not pass biometric accreditation, a book of registered voters will be checked to ensure that the person is eligible. If the record of the person is still not found in the book, he/she will not be allowed to cast a vote. Voters who are verified and are genuine shall proceed to vote their preferred candidate. After which INEC officials will proceed in sorting and counting the votes cast and the result will be collated and sent to the appropriate centers.

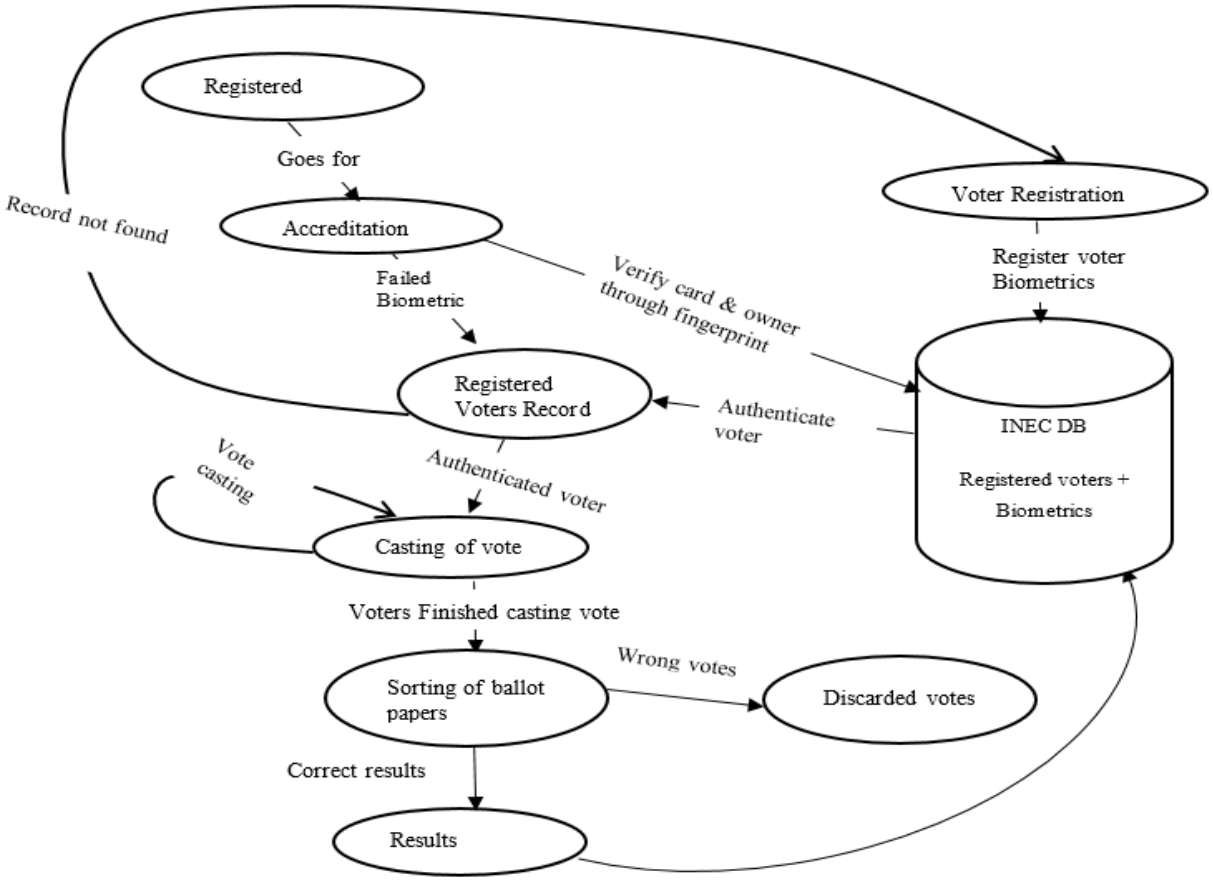

Fig 1.1: Process Diagram for the current election system adapted from Opara (2015)

Problems Associated With the Existing System

The following are some of the problems encountered while using the current voting system: (Olusola et al., 2012, Ganiyu et al., 2015, Gibson et al., 2016, Shuaibu et al., 2017)

Balloting System

(i) High rate of rigging.
(ii) Threats of violence at polling units.
(iii) Hijacking of ballot papers/boxes.
(iv) High cost of organization election.
(v) Time consuming.

Online Voting

(i) Must have a smart phone.
(ii) Might not reach the rural areas.
(iii) May be harmful and Vulnerable to threats (Cyber Attacks).
(iv) Hard to learn.

CONCEPTUAL PROCESS MODEL FOR ELECTION

The proposed model will be deployed using the USSD architecture. In other words, during deployment, the application is to reside in the GSM network. This will minimize the overall cost of conducting the election as oppose the current traditional/conventional system. Fig 1.2 and Fig 1.3 below shows the USSD architecture and the conceptual process model for election respectively.

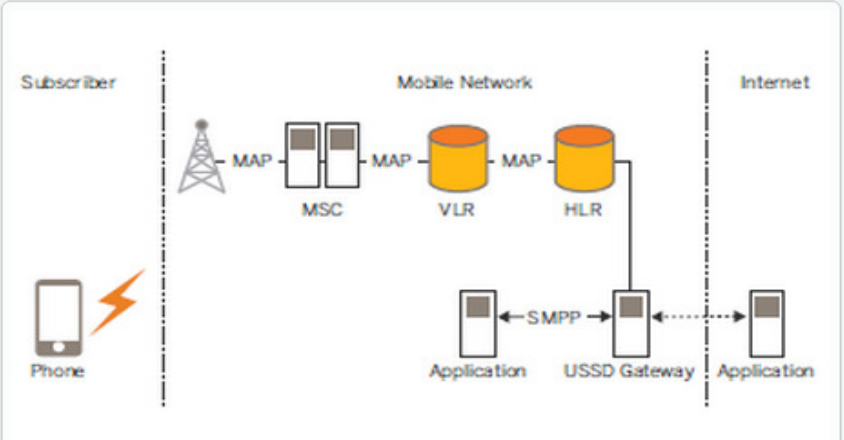

Fig 1.2: USSD architecture
Source: (Wikedzi et al., 2014).

Fig 1.2 above shows the USSD architecture being utilized by various mobile applications. This diagram is divided into three major parts which are the mobile subscriber (phone), mobile network (GSM network) and the Internet. The mobile phone connect to the GSM network by dialing a USSD code. Alternatively, the communication can be established by an application on the GSM network or an application on the Internet. The GSM network contains the Message Switching Center (MSC), Visitor Location Register (VLR) and Home location Register (HLR). If the application that the mobile phone wishes to communicate with reside in any of these resources in the GSM network, the interaction may be managed by any of the three centers (MSC, VLR and HLR) the application resides in. For instance, if it resides in MSC it will be managed by MSC; if it is in VLR it will be managed by VLR and so on. But in a situation where the application resides on the Internet, the USSD Gateway will route the message send by the mobile phone to the Internet and establish connection between the mobile phone subscriber and the application on the Internet. Each of these centers have Mobile Application Part (MAP) that converts the message to MAP format, and sends it to the appropriate mobile terminal for response. The interaction can take place in both ways. That is from mobile phone to GMS network and vice versa or from mobile phone to GMS network and then finally to an application on the Internet and then return in that other.

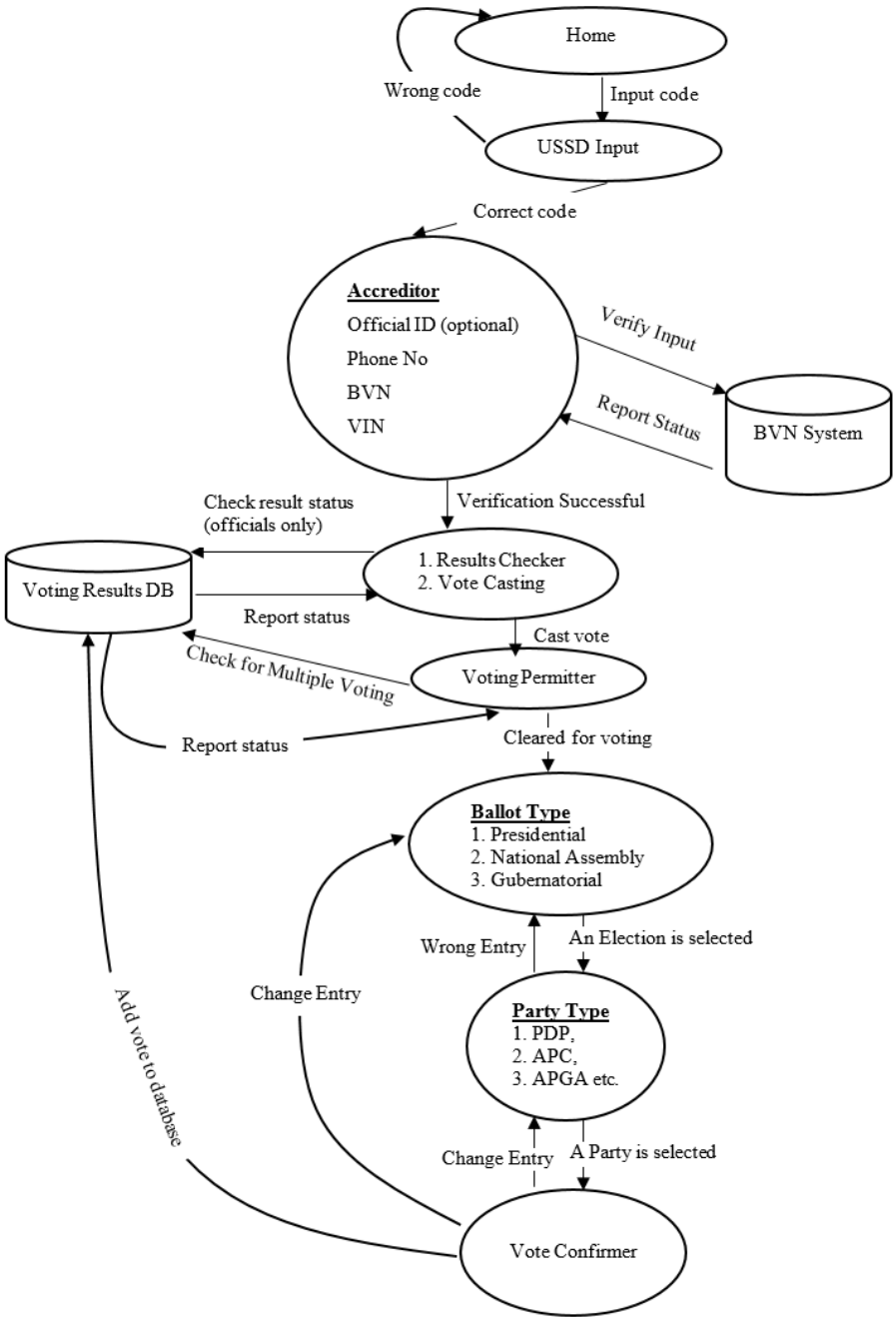

Fig 1.3: Conceptual Process Diagram for Election using USSD

Fig. 1.3 above is made up of eight (8) processes (*Home, USSD Input, Accreditor, Result Checker/Vote Caster, VotePermitter, Ballot Type, Party Type, and Vote Confirmer*) with a central database (*Voting Result and BVN System*). The system is to be hosted on the GSM network. A user begins by inputting USSD code (USSD Input). If the code is correct it will proceed to the *Accreditor;* if the code is wrong, it will go back to *home.* The *Accreditor process* will expect the user's phone number, BVN and VIN. Officials for each political party contesting in the election will be required to provide an additional official ID for checking election results. The voter's information shall be verified with the information in the *BVN System* database and the status is reported to the *Accreditor process* for necessary actions. If the biometric verification is

successful it will proceed to *Result checker/Vote caster Process*. An official can check the progress of the election results by requesting for the total votes cast for each candidate in the result database (*Voting Result DB*). As for voters, the *Vote Permitter Process* must check if the voter has already voted using any means (traditional or electronic). The process will either clear or prevent a voter from casting his/her vote. Once cleared for casting vote, the voter will now select the type of ballot (Presidential, National Assembly or Gubernatorial for instance) and after which he/she selects the preferred party. For any wrong entry for ballot type and party type, the voter have an opportunity to make changes before final confirmation of the selections and the result will be updated once confirmation is made by the voter.

SIGNICANCE AND CONTRIBUTION OF THIS RESEARCH PAPER

As mentioned earlier according toGaniyu et al. (2015) that an election process is said to have integrity when it is developed to be adequately robust so as to withstand several manipulative or fraudulent activities. The development of the model focused on the robustness of the election process. The robustness can be seen in terms of: *security*, *credibility*, *convenience*, *cost* and a high degree of *voters participation*.

Security: According Nyamtiga et al. (2013), the USSD technology has a high degree of security because no copy of the any communication with the server is accessed manually or stored in any customer's phone or Short Messaging Service Center (SMSC). The USSD ensures that only one session is established between the mobile terminal and the application server during communication. Besides, every communication is encrypted which prevents any misuse of data between the gateway and the server thereby minimizing the degree of human interference. In the model developed (Fig 1.3), the whole system will be using the USSD technology which will give a high degree of security.

Credibility: A system is considered credible if the system is being trusted and believed in (Ginsca et al., 2015). A user will trust a system if the user gets an immediate feedback. In the model developed (Fig 1.3), election results are checked in real time and multiple voting from a single voter is also prevented in real time using either the voter's phone number, BVN or VIN. As long as a person has cast a vote he/she cannot vote again. All votes are recorded. This will increase the credibility of the system which will encourage voters participation.

Convenience: Some intending voters are reluctant to turnout to vote because of the inconvenience during the voting exercise. The waiting time on queue at the polling unit discourage the voter(Olabisi and Chukwunoso, 2012). In the model developed (Fig 1.3), a voter must not be physically present at a polling unit to cast a vote. This will minimize the overall voting time.

Cost: The estimated cost used in conducting elections in 2011 and 2015 were N566.2-billion and N1 trillion respectively(Aiyede and Aregbeyen, 2012, Aziken et al., 2017). This implies that more expenses were made in purchase of more equipment. These equipment overtime will need to be replaced besides those that will fail during operation incurring more cost. In the model developed (Fig 1.3), much expenses are only incurred in the software development. Subsequent cost will be incurred during software maintenance. Human labour will also be minimized through system automation.

VotersParticipation: There were more voters turnout in 2011 presidential election as against 2015 election with a difference of about 10 million (10,000,000) votes(Ayanda and Odunayo, 2015). Insecurity being one of the reasons for low voters participation has been addressed in the model developed (Fig 1.3). It will not cost a voter so much to participate in the election in

terms of mobile data, smartphone and transportation. All that a voter need is any GSM phone – no need for mobile data or smartphone.

CONCLUSION

Political gladiators hold each other at the throat in Nigeria due to suspicion of one another regarding electoral fraud. They use thugs to rig elections, snatch ballot boxes and threaten electorates during elections. The federal government in conjunction with the Independent National Electoral Commission (INEC) are spending so much resources in ensuring that the election process is free and fair yet many lives are destroyed which is scaring many voters from participating in the National election process. The process model developed (If implemented and deployed) will go a long way in easing the work done at different compartments of the election processes such as accreditation, verification and authentication, vote casting, counting and presentation of results. Furthermore, the stress, threats and cost will be drastically minimized and above all improve the voters participation in Nigeria election.

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EFFECTIVE USE OF ASSISTIVE TECHNOLOGY IN EMPOWERING PUPILS WITH LEARNING DISABILITIES IN READING AND WRITING IN SELECTED PRIMARY SCHOOLS IN WUSE II, ABUJA, NIGERIA

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Abstract
This study focuses on the effective use of assistive technology in helping pupils with learning disabilities in primary schools. The study was carried out in primary schools in Wuse11 Abuja. Pupils with reading and writing disabilities experience difficulties with literacy tasks throughout their school days. The instrument used for this work consists of interview schedule constructed by the researchers with assistive technology specialists and pupils work samples analyzed. The study highlights the uses of assistive technology devices and services to support and help pupils with learning difficulties in primary schools. The findings of the work show that the use of assistive technology devices and services helped the pupils to understand better. It is recommended that assistive technology devices and services should be used by general education teachers, special educators, caregivers, parents and guardians to help children with learning difficulties to overcome and compensate for the impairment they have and be more independent in participating in academic work at school and at home.

Introduction
Assistive Technology is an umbrella term that includes assistive, adaptive, and rehabilitative devices for people with disabilities and also includes the process used in selecting, locating, and using them. The International Classification of Functioning, Disability and Health (ICF) defines assistive technology as any product, instrument, equipment or technology adapted or specially designed for improving the function of a person with disability. The International Organization for Standardization (ISO) defines assistive technology more broadly as any product that is used by or for persons with disability; for participation; to protect, support, train, measure or substitute for body functions/structures and activities; or to prevent impairments, activity limitations or participation restrictions. This includes devices, and software.

Pupils are children within the ages of 4-12 who are being taught in a child friendly school setting. Disabilities could be any form of mental or physical conditions where a human being cannot use or finds it hard to use a part or some parts of the body completely or easily. These disabilities could occur in learning thereby making it hard for the child to learn effectively. Learning entails having a basic communicating skill of reading and writing. Reading, is the ability to look at texts, symbols or any form of write-up and be able to understand them. Writing has to do with putting down texts and symbols on a surface especially using a pen or pencil. Managing pupils with learning disabilities could be tedious for teachers. The purpose of this work was to determine if assistive technology devices and software can help students with learning disabilities, particularly in the areas of reading and writing.

The research questions were: What assistive technology support is available for pupils with learning disabilities at the elementary levels? How effective were these devices and software programs in helping these pupils express themselves? In order to answer these research questions, the researchers read and analyzed scholarly articles that have been written on this topic. Assistive technology specialists in primary schools in Abuja were interviewed, and class work samples of pupils with learning disabilities were analyzed before and after the use of assistive technology. Based upon the work samples analyzed from the pupils, it is clear that assistive technology greatly helps pupils express themselves, increases their confidence, and enables them to participate in literacy activities with their peers. Therefore, it is essential that schools have assistive technology specialists who can support the pupils, their teachers, parents and guardians.

Statement of the Problem

Pupils with learning disabilities are seen as burden by their teachers and are most times made fun of by their teachers and fellow pupils. Some of these pupils also see themselves as useless to themselves and the society at large. The huge gap between high ability learners and learners with disabilities prompted the researchers to research ways by which these learners with disabilities can be integrated into the normal classroom setting without being relegated to the background.

The concept of Assistive Technology and its Legality in the Classroom Setting

Assistive technology [AT] is a set of tools and services that individuals with disabilities can access during school and work. According to (Dyal, Carpenter and Wright (2009): Flanagan, Bouck and Richardson, 2013: Judge, 2006; Kelker & Holt, 1997; Martinez-Marrero & Estrada Hernandez, 2008; Mitchen, Knight, Fitzgerald, Koury, & Boonseng, 2007; Netherton & Deal, 2006; Raskind & Higgins, 1998. Netherton and Deal (2006)) defined assistive technology as any piece of equipment or device that may be used by a person with a disability to perform specific tasks, improve functional capabilities, and become more independent and effective".

It is essential for Nigerian educators to be aware of assistive technology tools and services and should incorporate them in the classrooms, and provide support and instruction for pupils with disabilities who use them. And after being introduced into the classroom, it is essential for the assistive technology team of schools to thoroughly understand the academic needs of the disabled pupils and to provide the technology that will support the pupils in accessing the same materials as other classmates. During the selection process for matching the adaptation of the assistive technology to the pupil's needs, certain evaluation criteria should be considered, such as;

(i) Ease of use (setup operation, maintenance);
(ii) Amount of training required for the user (pupil) and provider (teacher, family);
(iii) Cost implications, to purchase, to maintain, and to repair;
(iv) Technological features (examples computer modifications, specialized software programs, compatibility with other devices);
(v) Functional assistance: that is, what it does (example, pencil grip enables some pupils with motor problems to grasp and hold a pencil more readily; speech synthesizer [with appropriate software] reads text shown on the monitor, thus enabling students with reading problems to access the text material);
(vi) Performance (reliable, durable, safe);
(vii) Adaptability: Use across environments and tasks;

Thus, it is important for the school's assistive technology team to thoroughly consider the pupils' needs, what support the pupil requires, and which assistive technology tools are appropriate for the pupils.

Assistive Technology and Literacy

Literacy is the ability to read and write. Almost all of the assistive technology devices and software that the assistive technology specialists work with are literacy based (Kelker & Holt, 1997; Lewis, 1998; Skylar, 2007; Raskind & Higgins, 1998). They use several computer programs to help pupils with both reading and writing. These programs are beneficial and they require significant training for both the pupils and teachers. One of the software programs that they use is text-to-speech. Another program that they use is Read & Write Gold. This software enables pupils to listen to a text and also interact with it (that is highlighting the important information, finding visuals, determining synonyms and antonyms of words). For example, if the class is reading about the Industrial Revolution, the pupils who use this software can pull up the text on a computer.

Therefore, this enables the pupils to read the same material as their peers. In turn, visually impaired pupils can participate in classroom discussions and work on assignments because they are able to hear the text. The assistive technology specialists explained that if a text is not available electronically, teachers can scan documents into the program. By doing so, pupils can access all handouts. The specialists also articulated that Read & Write Gold can read all texts on the Internet. For example, if a pupil wants to read an article that he finds on the Internet, the software will read it to the pupil. Another device that pupils can use is an iPad or iPod, where pupils can download literacy apps. For example, a pupil can download an app to practice grammar. One app that helps pupils is Dragon Naturally Speaking. This is a speech-to-text app. Forgave (2002), Lewis (1998), Martinez-Marrero & Estrada-Hernandez (2008), as well as Raskind and Higgins (1998) enumerates the usefulness of speech-to-text. The assistive technology specialists explained that the speech-to-text app is very helpful in aiding those pupils with reading and writing disabilities. This app enables the pupil to talk into the iPod or iPad. While the pupil verbally dictates, Dragon converts the speech into text. Once the pupil has completed the assignment by using Dragon, he can listen to what he has dictated and revise his writing. The specialists stated that there are different versions of Dragon and some spell check and place punctuation in the appropriate places. Another assistive technology that supports pupils with learning disabilities who struggle with reading is listening to books on tape. This can be helpful for pupils because they listen to sound clips of the text, comprehend the concepts, and participate in classroom activities and discussions.

Pupils with learning disabilities may struggle with writing (Forgave, 2002; Martinez-Marrero & Estrada-Hernandez, 2008). One tool that is beneficial for those pupils is a word processor (Lewis, 1998; Raskind & Higgins, 1998). The use of a word processor can help pupils who are having difficulties with writing letters, spelling, and using proper grammar. In particular, the use of a spell checker is helpful for pupils who struggle with spelling and is another tool that they can utilize. It is recommended that pupils with learning disabilities have the opportunities to learn how to use a keyboard so that they do not feel frustrated when typing.

Although assistive technology can be used at any grade level, there are different assistive technology devices that work better in elementary schools than in secondary settings. One of these devices is the Talking Storybooks.

Typical talking storybook programs present an entire work of children's literature on CDROM disc. These are multimedia programs with impressive illustrations and high-quality digitized sound for speech, music, and sound effects. They are hypermedia in that they allow readers to interact with the text and in most cases, the visuals that accompany the text. The interactive nature of these storybooks serves two purposes: First, interactivity acts as a motivator to encourage pupils to persist in the reading task, and second, some interactive features provide assistance in reading (e.g. a reader may be able to select an unknown word in the text to hear it read aloud). The Talking Storybooks is ideal for students in the younger grades because the literature in the software is geared towards children in the elementary school years. Skylar (2007) wrote about a kindergarten teacher who used assistive technology in her classroom to help pupils learn words. The teacher used Class wide Peer Tutoring. The author writes that "Classwide Peer Tutoring (CWPT) is evidenced based, cooperative learning strategy that increases pupil's engagement with academic content. Across the classroom setting, pupils are paired with one another, reciprocally teaching each other by taking turns as tutor and tutee" (Skylar, 2007). To further make Classwide Peer Tutoring effective, the kindergarten teacher used a technological device called Mini-Me (Skylar, 2007). The Mini-Me is a voice recorder where pupils record themselves when they read words and are then able to hear themselves (Skylar, 2007). It is effective because pupils practice the words, record and listen to their reading of the words and it makes learning words engaging (Skylar, 2007).

Resolving barriers to assistive technology adoption

(i) Availability: Assistive technology products and services should be made available in sufficient quantity close to pupils home, school and communities.

(ii) Affordability: products and services should be made affordable to the family of every pupil that needs them by subsidizing the prize of products or technologies by government, non-governmental organizations and concerned community members.

(iii) Adaptability: products and services should be made adaptable and modifiable to ensure appropriate use.

(iv) Acceptability: product and services to be provided should be presented in a way that they will be accepted by the disabled pupils by considering their needs, preferences and expectations.

Research Methodology

The purpose of this work was to determine how assistive technology can support pupils with learning disabilities, particularly in the area of literacy. Therefore, this study took place in schools that employs assistive technology specialists. The interview of the assistive technology specialists took place in primary schools in Wuse 11, Abuja. The schools have assistive technology specialists their offices are located in the school. The assistive technology specialists assess pupils to determine if they qualify for a particular assistive technology device and if so, works with each pupil's team to provide the services that best support the pupil. The specialists directly work with the pupil and consults with the pupil's teachers to help them infuse the technology in the classroom. The assistive technology specialists also provide training to parents/guardians so that if applicable, the child can use the device/software in the home

setting. Hence, pupils can complete homework assignments and can study for exams at home, by using their assistive technology device.

Population and Sample

The population is made up all the primary school in Wuse 11 from which one was purposively selected with their pupils, teachers and parents because it is a school with effective use assistive technology devices and services. The participant in this study was the assistive technology specialists. Their responsibilities as assistive technology specialists, is to attend meetings, serve as a member on school committees, work with parents/guardians, students, and teachers, monitor student progress, and provide professional development workshops.

Research Instrument

The instrument used for this research is interview schedule constructed by the researchers. The role of the researchers in this work was to be interviewers. The assistive technology specialists were interviewed. Through the interview, the researchers further learned what assistive technology is all about, the role of the assistive technology specialist, the different types of devices/services that pupils can receive, and how assistive technology supports pupils, particularly how it builds their independence in the classroom setting.

Methodology

Simple expo factor research method was used for this. Examples of disabled pupils' work before and after the utilization of assistive technology (the pupils' names did not appear on the work samples). The researchers carefully observed and analyzed the differences between the work samples. The assistive technology specialists were asked several questions throughout the interview. They provided the researchers with work samples of some disabled pupils. The study concentrated on the use of assistive technology to support pupils who have difficulties in the areas of reading and writing. Data was collected by studying the work samples of disabled pupils that were made available by the assistive technology specialists. The work samples include assignments, tests and tasks that pupils completed prior to and after employing the assistive technology devices and/or software.

Informed Consent: The researchers explained the work to the assistive technology specialists, and they signed the consent letter in order to participate. The assistive technology specialists had a clear understanding of their rights, as these were stated in the consent letter. They voluntarily participated in the work. To protect their confidentiality, a pseudonym is being used.

Data Collection

Data collection was done for this study by interviewing the assistive technology specialists and analyzing pupils' work samples. During the interview, notes on the assistive technology specialist's responses were taken. The work samples that the specialists showed the researchers were also analyzed critically. Through the collected samples, the researchers observed the differences between the work samples before and after the use of assistive technology.

Data Analysis

The researchers analyzed the data attained from the interview and the work samples read over the responses that the assistive technology specialists provided during the interview and highlighted the important information that demonstrates how the use of assistive technology

can help pupils who are having difficulties with reading and writing. While studying these work samples, the researchers took notes on the differences and similarities between the ones that were completed with the use of technology and the ones without the utilization of the assistive device, service and software. The researcher took note of the presentation of the work samples (formation of letters), as well as the content of the work samples (that is the level of description that each one had and use of proper spelling and grammar).

Based upon data analysis, the researchers were able to gather evidence that would answer the research questions.

Result and Discussion

Work Samples

The assistive technology specialists provided the researchers with work samples from a class of 32 pupils. The pupils' names did not appear on the samples. The purpose of this is to protect pupil's confidentiality. The samples demonstrate the success that pupils can experience when they use assistive technology devices and software. In the following paragraphs, the researcher describes the writing samples of two pupils (pupil A and pupil B).

Pupil A, who is in primary 6, was given the task to write a response about the book that her class recently read. Before utilizing the assistive technology device, the pupil only wrote one sentence and the pupil's handwriting was difficult to read. The spelling was incorrect and all the words blended together without any spaces between them. The pupil did not capitalize the first letter in a sentence. When the pupil used Dragon Naturally Speaking technology, she produced an entire paragraph. Pupil A's paragraph had correct grammar and spelling. The only errors the pupil made were that there was no space after one word and the first letter of one sentence was not capitalized. By using Dragon assistive technology, pupil A was able to produce a writing sample that was on grade level. Her writing was well organized and contained proper grammar. The pupil expanded her writing by including details. This example demonstrates that without speech-to-text, the student had difficulties expressing herself in writing. However, with the use of assistive technology which in this case was Dragon, the pupil exemplified what she knew about the book and made up a paragraph that illustrated her thoughts. The following chart shows the number of words the pupil was able to write prior to using Dragon technology and the number of words she was able to write after the use of this technology.

Number of words in writing piece prior to using Dragon	**Number of words in writing piece with the use of Dragon**
10 words	**86 words**

As demonstrated in pupil's A writing, it is evident that the pupil was able to effectively express her ideas and add details, when using the app. She greatly expanded her writing because prior to the use of Dragon, she handwrote one sentence, and after using the app, the pupil successfully wrote one paragraph. This immense difference illustrates that assistive technology can have a positive impact.

Pupil B is in primary 2. He does not recognize the letters in the alphabet. Reading and writing is very difficult for the pupil. However, by using assistive technology, pupil B was able to complete

his assignment. The pupil's task was to write what he did over the weekend. He used an app on his iPad which enabled him to pick pictures that would express his ideas. For example, he wanted to write about a house. Using the app, he found a picture of a house. Underneath the picture of a house, the word house was written. Therefore, after pupil B generated the pictures that he needed, he was able to copy the words that appeared underneath the pictures into pages, on his iPad. The sentence that he wrote was "my dad house." He was attempting to write "I went to my dad's house." Although what he wrote is not a complete sentence, the pupil was able to use assistive technology in order to express his idea.

Conclusion

The assistive technology specialist's position requires them to multi-task. They do not only ensure that the pupils' technology is properly working, but they instruct the pupils and provide support to educators and caregivers. They needs to monitor pupils' progress as well as adjust the types of supports that the pupils need in order to be successful. They assess pupils, and complete progress reports. The services that the Specialists provide are important as they offer pupils and educators the skills needed to integrate the technology into the classroom and help pupils experience success. They also stay current on the latest research in the field and participate in workshops and conferences so that they are knowledgeable of the new assistive technology devices and software, particularly since technology is consistently evolving. Based on the work samples, it is evident that pupils who use the devices or software make significant gains. Both pupils A and B were able to express themselves through the use of assistive technology. This not only helps the pupils make academic progress, but pupils feel more confident in school. The use of assistive technology, as evident through the interview with Specialists and the analysis of pupils' work samples, is beneficial for pupils with learning disabilities.

Summary and Recommendation

As found in the research and analysis of pupils' work samples, assistive technology can greatly help pupils with their reading and writing development. In terms of reading, assistive technology devices and software, such as the one that the specialists showed the researchers, Read and Write Gold, helps pupils read grade level passages, engage with the texts, and participate in classroom discussions. Pupils can use this software to read any type of text, whether it is a passage from a textbook or an online article.

Assistive technology can also help pupils with writing challenges for example, the Dragon technology, enables pupils who struggle with writing to verbally dictate their thoughts and produce a written piece. There are also several other technology apps that pupils can access on their iPods and iPads that will help them with decoding, reading stories, and practice concepts, like grammar. Assistive technology is effective for pupils with learning disabilities, and it is recommended that an assistive technology specialist be made a member of any school team in order to assess pupils effectively and work with the pupils'.

Therefore, in order for pupils to receive the assistive technology support that they need, it is significant for an assistive technology specialist to work with the pupils from the initial steps of the process (evaluation) to the monitoring of the pupils' progress. It is evident from this study that teachers should consider referring pupils for assistive technology evaluations when they observe that pupils are having difficulties with reading and writing. Teachers need to be open to receiving training from assistive technology specialists so that they can learn how to infuse the

technology into the classrooms. By doing so, not only will teachers grow as professionals, but they will support pupils' academic progress. By being aware of assistive technology devices and software, caregivers can advocate for their children. If a parent/guardian observes that his child is struggling with completing homework due to difficulties with reading and writing, he should talk to his child's teacher regarding the consideration of assistive technology. The Nigerian government should enact a law (an act) to ensure that children with learning disabilities are included in the inclusive classroom setting.

Study Limitations

This work had limitations. The first limitation was time. There were few weeks to complete this work. If there was more time, the researchers would have spent more time with the assistive technology specialists outside Wuse 11. Another limitation was the participants. In the future, the researchers would interview more assistive technology specialists and directly work with pupils who use assistive technology. This would give the researchers the opportunity to further learn about the roles and responsibilities of assistive technology specialists in other states, as well as the programs that are available in different schools.

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IMPACT OF REALIA INSTRUCTIONAL MATERIAL ON ACADEMIC ACHIEVEMENT AMONG SECONDARY SCHOOL BIOLOGY STUDENTS IN LAPAI METROPOLIS OF NIGER STATE

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Abstract
This study investigated the impact of Realia Instructional Material on academic achievement among secondary school biology students in Lapai metropolis of Niger State. Quasi experimental research design was used for the study. A total of 160 (SS II) biology students from two randomly selected government owned secondary schools in Lapai metropolis were used for the study. One school was assigned to experimental group and taught the concept of pollination in plant using realia instructional material while the other school was used as control group and taught the same concept using conventional lecture method. The test instrument used for data collection was a 30-item test questions drawn from West Africa Examination Council (WAEC) and National Examinations Council (NECO) past questions and modified and used for this study. The test instrument was validated by relevant experts, pilot tested and its reliability coefficient determined to be 0.81. Two null hypotheses were formulated and tested at 0.05 significant level. t-test statistic was used to analyze the data obtained. Findings of this study revealed that, the use of realia instructional material enhanced students' academic achievement on the concept of pollination in plant. It was therefore, recommended amongst others that, government should organize seminars, workshops and conferences on the use of realia instructional material as an instructional strategy for teachers at secondary school level to enhance effective teaching and learning of biology in particular and sciences in general.

Key word: Academics, Achievement, Biology, Instructional Material, Plant, Pollination, Realia and Students

Introduction

Educationists, policy makers, parents as well as the society in general is highly interested in better result from science students at secondary school level because, knowledge of science is one of the prerequisite requirements for admission into higher institution for manpower development necessary for individual and national development. Unfortunately, researches reveal that secondary school students have been performing below expectation especially in science subjects (Osakwe, 2003 & Bosse, 2007). Low performance consistently recorded by secondary school science students at final Senior School Certificate Examinations (SSCE) conducted by West African Examinations Council (WAEC) and National Examinations Council (NECO) has become an issue of concern not only to individual members of the society but also to the Government (Nancy, 2010; Cepni & Kose, 2006; Okwo & Otubah, 2007 & Nwachukwu,

2007). Many researchers have reported that many factors are responsible for mass failure of secondary school science students. Some of the identified factors include

(i) Teachers' poor pedagogical strategy
(ii) Inadequate and relevant instructional materials
(iv) Students' poor attitude towards studies amongst others (Okwo & Iliya, 2004; Koroka & Ezenwa, 2009; Jong, 2010 & Mohammed, 2011). Some researchers reported that inadequate and irrelevant instructional materials in most of our secondary schools are the major factors responsible for the students' poor performance. Researchers asserted that use of Realia (real material) as an instructional material by science teachers would help minimize the rate at which science students performs poorly at their final SSCE examinations (Abdullahi, 1982; Akinbobola, 2005 & Bosse, 2007).
(v)

Realia (real material) has been defined in many ways by many researchers. For instance, Akinbobola (2005) referred to Realia in classroom teaching as real objects or representation like charts, graph, specimens, and models which can either be of two or three dimensional objects that teachers use to teach abstract and difficult concepts more effectively. This definition implies that, except the individual student touches, handles or manipulates the instructional materials, hears, sees or examines the instructional materials, his base for learning will be limited. Hitch (2004) and Mohammed (2011) observed that absence of perceptive learning material consequently hinders conceptual understanding of the learning topic and also hinders learner's ability to transmit concrete knowledge to abstract mode of thought.

Mohammed (2011) reported that, the use of realia adds interest, activity and novelty to the lesson. Realia (real Material) if effectively used by teachier in classroom, provides framework where information can be defined, collected, ordered, explain and communicated (Adedokun, 2009). Realia also enables some group of phenomena to be visualized and comprehended (Mohammed, 2011).

Thus, in order for both teacher and students to achieve and retain their objectives in teaching and learning of sciences especially Biology, issues involving innovations in methodology must be properly addressed using the locally generated empirical evidences as instructional materials.

Statement of the Research Problem

The development of a country in terms of science and technological advancement depends greatly on the knowledge of science among her citizens. Scientific knowledge cannot be effectively acquired unless it is effectively taught. It is therefore, disheartening to observe from research findings that, teaching of science subjects especially Biology at secondary school level of our educational system is ineffective resulting to poor performance of students at final Senior School Certificate Examinations (Damirel, 2004; Osakwe, 2003; NECO, 2012 & WAEC, 2013). Bosse (2007) revealed that, poor performance of students in public examinations is mostly attributed to teachers' poor instructional strategy due to lack of relevant instructional material. WAEC (2014) revealed that Biology students' performance in the areas of drawing, labeling and interpretation of experiments is very poor. This is due to lack of instructional material or poor usage of instructional material during instruction hence, students' poor performance at the final SSCE examinations. This research study is therefore aimed at investigating the Impact of Realia instructional material on academic achievement among secondary school biology students in Lapai metropolis of Niger State.

Aim and Objectives of the Study

This study aimed at investigating the Impact of Realia instructional material on academic achievement among secondary school biology students in Lapai metropolis of Niger State. Specifically, the study strived to achieve the following objectives. They are to determine:

(i) The Impact of Realia instructional material on academic achievement among secondary school biology students in Lapai metropolis of Niger State.

(ii) The gender impact of Realia instructional material on achievement among secondary school biology students in Lapai metropolis of Niger State.

Research Question

The following research questions were raised to guide the study:

(i) Is there any significant difference between the academic achievements of students taught the concept of pollination in plant using Realia instructional material and those taught by conventional lecture method?

(ii) Is there any difference in academic achievement of male and female students taught the concept of pollination in plant using Realia instructional material?

Research Hypotheses

The following null hypotheses were formulated and tasted at 0.05 significant level

HO_1. There is no significant difference between the academic achievement of biology students taught the concept of pollination in plant using Realia instructional material and those taught by conventional lecture method.

HO_2. There is no any difference in academic achievement of male and female biology students taught the concept of pollination in plant using Realia instructional material

Research Methodology

Research Design

The research design adopted for this study is quasi – Experimental Research Design (Non – Equivalent, Pretest, Posttest, Experimental and Control group design) as is shown in table1

Table 1: Research Design Layout

Group	School	Pretest	Treatment	Postest	Male	Female	Total
Experimental Group	MKSS, Lapai	O_1	X	O_2	48	42	90
Control Group	DSS, Lapai	O_1	-	O_2	36	34	70
Total					84	76	160

Where:

0_1 and 0_2 = Pretest and Posttest for Experimental and Control groups

X = Treatment (using Realia) and **-** Conventional method.

Population of the Study

The population for the study comprises of all the one thousand and eighty (1,080) senior secondary two students {male (620) and female (460)} in Lapai metropolis of Niger State. From the population, a sample size of one hundred and sixty (160) SSII students {male (84) and female (76)} was used for the study.

Sample and Sampling Techniques
Two Co-educational Public Secondary Schools were randomly sampled and used for the study. The sampled schools are (1) Mamuhmadu Kobo Secondary School (MKSS), Lapai and (2) Day Secondary School (DSS), Lapai. MKSS, Lapai was randomly assigned to experimental group while DSS, Lapai was assigned to control group. In each of the schools, an intact class was randomly selected and used for the study.

Instrumentation
Treatment Instrument and Test Instruments were the two instruments used for the study. Treatment instrument comprise of Realia instructional material which was used on the experimental group to teach the concept of Pollination in plant and Conventional lecture method which was used on the control group to teach the same topic in biology. Test instrument on the other hand is a 30- Multiple Choice Test Items on Pollination in plant which was used for data collection (pretest and posttest). The test items were adapted from WAEC and NECO past examination question papers.

Validation of the Test Instrument
A total of forty questions were initially drawn from WAEC and NECO past questions and were modified by the researchers. Thereafter, they were given to three experts in the area of biology education for validation. Their suggestions and recommendations led to dropping of ten items and the remaining thirty items were used as the final test items for data collection. Each correct answer carried 1mark given a total of 30 marks. This score was later converted to percentages to obtain the final score of individual students in both the experimental and control groups.

Reliability of the Instrument
Pilot test was conducted at Zainb Kure Secondary School, Lapai which was not among the sampled schools used for the study. Test – retest method was used with an interval of two weeks between the first and second administration of the test items. The two set of scores obtained were subjected to analysis using Pearson Product Moment Correlation (PPMC) and r value of 0.81 was obtained indicating that, the instrument is reliable and can be used for the study.

Method of Data Collection
After the researchers have visited the sampled schools for permission to use the schools and permission granted, staff and students of the schools given orientation about the research, a pretest was administered to both experimental and control group students. Thereafter, the experimental group was taught the concept of pollination in plant using Realia instructional material while control group was taught the same topic using Conventional lecture method. After the treatment, posttest was administered to both groups, their scripts were collected and marked and posttest scores were obtained. The two set of scores obtained (pretest and posttest) were analyzed using mean, standard deviation and t-test statistics using the Statistical Package for Social Science (SPSS) Version 20:00

Results and Discussions

Pretest Result

Table 2: Mean, Standard Deviation and t-test analysis of Experimental and Control groups in pretest.

Group	N	df	Mean (x)	SD	t	p-value	
Experimental group	90		15.83	8.518			
		158				.067	.793
Control group score	70		16.17	7.844			

Result in table 2 shows the mean score of the experimental group to be 15.83 with Standard Deviation of 8.518 and that of the control group to be 16.17 with Standard Deviation of 7.844 and P-value of 0.793. This result indicates no significant difference in their mean scores. Therefore, the entry behavior of the two groups was equivalent.

Research Hypotheses

$HO_{1.}$ There is no significant difference between the academic achievement of biology students taught the concept of pollination in plant using Realia instructional material and those taught by conventional lecture method.

Table 3: Mean, Standard Deviation and t-test analysis of the Experimental and Control groups in Posttest.

Group	N	df	Mean(x)	SD	t-cal	P-vale	
Experimental group	90		49.17	13.460			
		158				3.882	.040
Control group	70		30.00	9.738			

S= Significant at 0.05

Table 3 shows that the experimental group taught pollination in plant using Realia instructional material had a mean score of 49.17 with Standard Deviation of 13.460 and the control group had a mean score of 30.00 with Standard Deviation of 9.738. This result reveals a significantly difference between experimental and control groups. The result also revealed that, t-calculated value was 3.882 and P-value of 0.040 which is significant at 0.05. Therefore, hypothesis one is rejected since there is a significant difference between the mean achievement scores of experimental group taught pollination in plant using Realia instructional material and control group taught without Realia instructional material.

HO_2. There is no any difference in academic achievement between male and female biology students taught the concept of pollination in plant using Realia instructional material

Table 4: Mean, Standard Deviation and t-test analysis of male and female students in experimental group.

Variable	N	df	Mean(x)	SD	t-cal	P-value
Male	54		49.44	13.382		
		88			.126	.726
Female	36		48.75	14.162		

NS= Not Significant at P< 0.05

Table 4 indicates that the male students had mean score of 49.44 with standard deviation of 13.382, while female students had a mean score of 48.75, and Standard Deviation of 14.162. The t-calculated is 0.126 and P-value is 0.726. The result indicates that there is no significant difference in the mean score of male and female in the experimental group. This therefore implies that gender has no significant difference in academic achievement when they are exposed to the same treatment using Realia instructional material.

Discussion of Results

The pretest result indicates no significant difference in the pretest mean score of experimental and control groups. The result therefore indicates that, the entry behavior of the two groups were equivalent on the concept of pollination in plant before the treatment.

Analysis of research hypothesis one revealed that the experimental group achieved significantly higher than the control group. Also, male and female students had no significant difference in their academic achievement when taught the concept of pollination in plant using Realia instructional material.

Table 3 indicates that, the experimental group achieved significantly higher than control group. The t-cal was 3.882 and P-value was 0.040 which is lower than 0.05 significant level. This then implies that it is significant at 0.05. Therefore, hypothesis one is rejected. This finding is in consonant with that of Nancy (2010); Okwo et al (2007); David (2008); Nwachukwu and Nwosu, (2007) as they all reported that the experimental group achieved higher than the control group when Realia instructional material was used to teach students as compared to the use of graphic, diagrams and charts for teaching senior secondary school biology students. They reported that, the use of Realia enhance learning achievement of students.

Table 4 revealed that, male students had mean score of 49.44 with standard deviation of 13.382, while female students had a mean score of 48.75 with Standard Deviation of 14.162. The t-cal was 0.126 and P-value was 0.726 which is higher than 0.05 significant level. This then implies that, it is not significant at 0.05. This result therefore reveals that there was no gender difference in academic achievement of biology students taught the concept of pollution in plant using Realia Instructional Material. However hypothesis two is accepted. This finding is in consonant with the finding of Farkonh (2010) who reported no significant difference in academic achievements of students, when system approach for solving chemistry practical was used in secondary schools, however disagree with the findings of Msheliza (2000); Kim & Axelrod (2005); Okwo and Otubah (2007); Nwachukwu

and Nwosu (2007) who reported that the experimental group male students achieved better than their female counterparts when they are exposed to the same treatment.

Summary, Conclusion and Recommendations

Summary

The study investigated the Impact of Realia Instructional Material on academic achievement among secondary school biology students in Lapai metropolis of Niger State. The students used for this study were found to be equal in terms of their entry behavior on the concept of pollination in plant. There was a significant difference between the achievement scores of experimental and control group students. However, there was no gender difference.

Major Findings of the Study

The following findings have been made from the research work:

(i) Academic achievement of the biology students in the experimental group was found to be enhanced as a result of Realia Instructional Material used for teaching them the concept of pollination in plant.

(ii) Realia Instructional Material was found to be gender friendly as it enhanced them academic achievement on the concept of pollination in plant equally.

Conclusion

The conclusions drawn from the research are as follows:

The effectiveness and efficient use of realia instructional material enhanced students understanding and achievement. This is evident in the experimental group mean score which is higher than that of the control group in posttest. The use of realia makes teaching and learning more explicit. It serves as a clue to understanding of same concepts. Emphasis should therefore be laid on the use of realia instructional material for teaching of biology in our secondary schools.

Recommendations

In view of the findings of this research study, the researchers recommend the followings:

(i) Teachers should be encouraged to use Realia instructional material during classroom instruction.

(ii) Seminars, workshops, conferences, should be organized for teachers on the use of Realia instructional material.

(iii) Government, educational administrators/principals of various schools should support and encourage the creativity of science teachers by giving some incentives for the effective usage of Realia Instructional Material during classroom instruction.

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AN ASSESSMENT OF DISRUPTIVE INNOVATIONS TRENDS IN CHANGING RADIO TO R@DIO FOR EFFECTIVE TEACHING AND LEARNING IN TERTIARY INSTITUTIONS.

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Abstract:
Radio has always been part of human lives. It has also been a profitable business since the early days of broadcasting. Traditional radio has failed to properly engaged the contemporary generation and faced the threat of being subsumed by digital innovation which is becoming a new discovery among generation -Z. Today, all sorts of digital devices have combined to create a 'self-media' environment that resituates radio, in the face of new challenges. This paper is based on a deeper understanding of radio broadcasting as a cultural industry and audience behavior to focus on groundbreaking approaches to radio in the context of cross-media, multi-platform and audience interaction with media contents.

Keywords: Disruptive innovations, Radio, Convergence, Interactivity, e-listeners, generation-Z, cloud computing and the internet.

Introduction

Radio broadcasting is in a process of change. Broadcasters are looking for new perspectives to make the business profitable and face digital media competition. Radio research has reached a two way perspective, with researchers understanding radio both as sound broadcasting and other forms of media, as well as questioning radio as a social institution.

This research focuses on changes occurring in broadcasting by analyzing radio station websites, its involvement on the social media platforms. platforms of broadcasting and streaming, to characterize the transformation of radio, in terms of distribution. By using desk research and key examples from Nigerian radio broadcasting industry, the researcher presents a new concept of streamed audio content, to understood radio as radio, presenting proposals that aim to situate radio broadcasting in a context of severe competition for people's attention among all available audio contents.

Statement of Problem

Digitalization and the internet are fundamentally changing media markets, particularly radio. Recently we have seen a huge increase of leisure time spent with entertainment. There are also new forms of entertainment, we no longer have just TV, radio, magazines or newspapers. But radio podcasts, video games and, of course, web-based content are emerging and competing for audience attention.

Students, who constitue majority of radio listeners have access to an increasing amount of content: news information and entertainment in different platforms and formats on radio. Consequently, a new audience emerges, non-traditional, non-passive but participative and independent. Tabernero (2009) submits that the Internet is a competitor to established media

organizations and can be an alternative source of information and entertainment and a means of access to new and emerging channels and platforms.
Along with traditional media companies, new players are approaching consumers as content producers and distributors. Changes in communicative processes within the media and new media ecology analysis are enriched by examples that display common features in interactivity and participation: convergence and cloud computing about radio. The new media environment challenges traditional radio broadcasters that are online to improve their traditional broadcasting, towards multimedia content and distribution. This essay explores the ways in which radio broadcasters are increasing interactivity among students and also responding to increasing demands for enhanced classroom content and identifies opportunities and bottlenecks for radio broadcasters' online development.

Theoretical Framework
It will not be out of place to appreciate the relevance of other theories in this study. First, the ***Technological Determinism Theory***. This theory was propounded by Marshal Mcluhan in the 1960s. It explains that all social, educational, political, economic and cultural changes are influence by advances in technological innovations. In other words, as technology advances all sectors of human endeavors are influenced. The ***Diffusion of Innovations theory*** is also another theory that is closely linked to this study. It focuses on analysis of how innovations or new ideas can spread as technology advances. Different innovations are adapted using technology. However, a prominent theory that can properly be situated within the purview of this study, is the ***Theory of Disruptive Innovation.*** Propounded by Michael Christensen in 1997, the wind of innovative strategies and changes appeared in the Mid-1990s and swept through industries, sinking weak and outdated companies. This gale of creative destruction has threatened even some of the strongest businesses in the world. Clayton (1997) wrote in his book, the *innovator's Dilemma*, he provides an explanation for the failure of respected and well-managed companies. He argued that good managers face a dilemma even though they did the very things they need to do to succeed – they listen to customers, invest in the business, and build distinctive capabilities – they run the risk of ignoring rivals with "disruptive" innovations.

Radio Broadcasting Industry
The emergence of media with cross multiple domains, their influence on educational, economical, political power structures and the manufacture of content, along with other media effects in society led to the adoption of professional structures and strategic management in radio to face a competitive market economy. The media help to contextualize our values, beliefs and sense of aesthetics, since our experience relies on media to get current news and facts. Media activity comprises of establishing an educational and cultural production network that helps in framing reality by giving us a self-image of our society.

According to Hesmondhalgh (2002), consumption culture is connected to radio content, reproducing cultural experiences and interactions between symbolic and cultural meanings framed upon industrial production. Radio business uses economies of scale to ensure market share and expansion: radio's communication may have above all a symbolic meaning, particularly where music is the main content of programming structure. This is a perspective approaches radio as producing symbolic content, with value based on newness and constant renewal, clearly influenced by Flichy's (1991) concept of a **flux economy** and Miège's (2000) approach to **consumer expectations**.

The radio industry is currently striving to become a more web-based and multimedia business. Ezeh (2015) notes that modern radio stations operate on the information super highways, and they attract students because the speed of information dissemination has increased tremendously. This is currently framed by a set of three different, though interchangeable elements: coverage (spectrum distribution); branding and content, which relate to each other to create the third; a business structure that, as Hesmondhalgh (2002) has argued, fits the educational industry framework via broadcasters' professional complex system of production. Further, the intangibility of radio content places the radio broadcasting industry within the educational industry system, which depends upon defining distinct audiences. For that, "music radio stations have branded themselves differently from each other to attract niche audiences especially students" (Nyre, 2008: 102). Coverage influences branding and content. Branding depends upon content (radio format) and content is defined by coverage. By ensuring comfort of listening, they are guaranteeing that content reaches people and that they maintain contact with their brand. Thus, comfort of listening is the baseline for a successful radio station. Today, although terrestrial radio broadcasting is still the most important distribution platform, online is no longer just a complement to FM. Rather, it is replacing it in some instances among students.
In Nigeria, most important radio groups such as the campus radio ought to have a management structure with departments for different educational areas and teams for each radio programme, concerning activities like; programming, music, presenters, sales, marketing and multimedia. Content in radio is shaped by this process. Branding becomes reliable when the product meets listener's expectations. Therefore, broadcasters invest in good quality content, celebrities and well-known presenters, organized within radio formats, as a consequence to radio segmentation and branding, intending to establish a community of listeners around their radio brand.

Changing Media: Changing Radio?

The internet is a global thing now and that may have led broadcasters to approach it in two different, though complementary, ways: using it as a process (creating intranets for content production and management, and as a working tool, for source of information and news gathering); and as a distribution platform. In this sense, streaming technology has become crucial for radio's online development, providing live audio transmissions. Streaming is the access technology making radio broadcasting available via digital devices (computers, mobile phones, tablets) and networks (spreading of radio content through the web using sharing tools). Again, Ukonu, Ani and Ndubusi (2013) have submit that listening to radio online is gradually gaining ground and is likely to lead to a decline in listening to terrestrial radio. Radio, today is available both in digital and analogue platforms that are combined, to fit with audience needs, uses and routines with media. Agboola (2014) explains that the younger generation preference for online radio is one of the factors responsible for slight decline in terrestrial radio listenership.

Multimedia takes radio out of its traditional business and broadcasting model, updating a medium with a history of nearly a century, and giving the listener a broad set of capabilities. The word derives from the Latin radiu (radius) or radio, which means telephony (communication by electronic air waves). Radio also refers to the air-waves receiver. Broadcasting is the transmission of electronic media, corresponding to a human need to share community and transmit information at a distance, now enlarged through the Internet.
Convergence results from dynamics in technology and synergies of media, computing and telecommunications, adding value to existing processes and creating new ones. These establish

a digital culture in which every device and content is re-conceptualized as digital. The same happens to radio broadcasting.

Disruptive Innovation Trends

Let's focus on interactivity and participation; convergence and cloud computing, to approach radio broadcasting's most important transformations from radio to radio.

Interaction is understood to be the communication between user and system, nevertheless, social sciences and media studies approaches to interaction focus mainly on social, cultural and organizational issues that provide the context of interaction. One can argue that by inter relating these approaches we can build a model of interaction that fits perfectly the creation of classroom situation in radio broadcasting. Interaction involves the user and the system. It is a complex process that includes both questions and answers requiring that communicators respond to each other.

But also, computer interfaces have become ubiquitous and integrated into all the environments we live in. Computer interfaces are also a common way to access media, particularly, radio: "continuous access to devices that provide enhanced communication and information processing functionality will change the environment in which we live as the devices influence the way we communicate and interact socially. In fact, by extending radio to Internet, broadcasters have made radio dependent upon digital devices and interfaces, thus, influencing radio's communication and interaction with and among students of tertiary institutions.

It is multi-way, meaning that it involves two or more actors; it is immediate, as responses occur within seconds; and it is contingent in that the responses of one actor follow directly and logically from the action of another. By using digital devices and computer interfaces, interactive systems and frameworks applied to radio establish different types of interaction, changing its effectiveness, which depends mostly on two different factors: the design of the interface that allows the user to express himself; and the computer literacy of radio listener. Hence, another factor may also be included, concerning socio-cultural factors that go beyond broadcasters' intentions: the interface might also influence interaction between the user and his or her computer.

In media, the goal is to be able to give feedback, introduce ideas, comment or simply take part in the communication process, participating in media content and conversations. Or, it may be to access the network, use its resources and the value those resources have. At a second level, interactivity can propel group integration and access specific forms of imagined communities, as happens in radio broadcasting with communities of listeners around radio stations, and in particular around communities of fans established on Facebook. In this sense, available insights on radio station pages show that Radio's content can reach thousands of students. Both ***Search FM, Ultimate FM*** and scores of other radio stations have hundreds of people talking about the radio stations' posts every day, representing high levels of interaction in these pages, through shares (post-sharing) and comments (commenting on posts). You can imagine if the content is educational.

If we consider the search for interactive systems from the early days of broadcasting, we should note that Bertolt Brecht in the 1930s (Cordeiro, 2011) proposed the transformation of radio from a transmission and distribution to an interactive medium, organized as a transmitter and receiver that binds listeners to each other through their contributions. Multi-national radio

stations like the ***BBC, RFI, VOA, DW*** and so on have long converged using innovative engines like; sound cloud, iTunes, stitches, radio podcast etc. In radio, interactive systems and mediation run counter to the notion of face-to-face interaction, and thus can be seen to recontextualised social and educational relations in public space.

Listeners' participation in radio is today also an online participation. It is characterized by written posts, such as email, blog comments, or online social networks posts; Facebook, Twitter,(video and audio). Radio broadcasters are creating multimedia content. These are multiplatform, establishing different narratives or a continuous narrative available in multiple forms, in most cases quite similar to those that characterize listener participation. Radio stations commonly have live streaming, posts in online social networks or blogs, on-demand videos, and audio podcasts. In radio, interactivity has long been closely related to different forms of participation: for example listener panels, letters, contests or call-ins. These models can be actualized in a digital context which enlarges the scheme of participation to interactive systems of communication in which, through a navigation interface, the listener participates without interacting directly with others. On the other hand, personalization of radio station's websites, listener-driven content, and on-demand content are features that admit participation and user control, being considered interactive.

Students can use their discursive capacity in a situation that is provided by the broadcaster; according to a predetermined theme that obeys certain rules which are again defined by the radio station which invites such participation. But even without affecting this decision making and its implied power relations, this still reveals a form of civic participation. It contributes to reconfiguring social and educational relations, by weakening privacy and/or by encouraging new forms of isolation, but at the same time allowing individuals to establish social relations with people with whom we would never interact directly and unmediated.

Convergence is allowing a change in linear media communications, by supporting the one-to-many traditional model of communication, but also establishing one-to-one, many-to-one or many-to-many communications, enabling conversations between users. Digitalization pushed the coming together of telecommunications, computing and broadcasting, and is transforming radio, integrating it into IP-based convergent services. Beyond this, the concept refers to a new strategy related to information management, its production and distribution. Boczkowski and Ferris (2005:3) argue that digitalization eliminates the boundaries between press, television, radio and online technologies. They explain that these features, content and services offered previously by separate media will be, in the future, provided through a single artifact, a networked computer or device.

Convergence in radio refers to the network architecture that broadcasters have adopted to merge previously distinct media (so-called traditional broadcasting or terrestrial broadcasting) into common interfaces on digital devices. Cloud computing is currently a hype designation, not always used in its perfect sense, referring to media and users content made available online. Cloud computing aims to allow access to enormous data in a virtualised manner by aggregating resources and offering a single system view. Cloud computing derives from infra-structure convergence and shared services. Objectively, its purpose is to contribute to easier manageability, faster processes, centralising services with data, software and devices, all available through an Application Programming Interface (API).

Radio stations are in addition developing multimedia content, storing and sharing online (videos, audio archives and pictures), incorporating ***weblogs, photoblogs, podcasts, videocasts,*** (as examples of social media) into their websites with associated sharing platforms, such as ***Facebook or Twitter*** buttons. Some radio stations also have web-only thematic music channels all over northern Nigeria; ***Radio Nagarta*** in Kaduna, ***Freedom radio*** in Kano, ***Prestige radio*** in Minna and so on have a website with several multimedia resources. ***Capital FM, Vision FM, Rhythm FM*** and many more have live cast (streaming their FM broadcasting); texts (news and entertainment); other forms of text-bios (the team and some radio shows); and on-demand videos (shows, specially produced videos, humor and hits). They also have an interface with content menu: the interface for the website, with text and images, links and interactivity features - online social networks (Facebook being the most used); blogs (for the team and some shows); images and video sharing (like ***Youtube and Flickr***). On Facebook, we can today find presenters interacting with the audience and creating conversations (searching for interaction all the time). Besides radio (terrestrial radio) there are new forms of radio, with resources that allow participation and interaction with listeners, who are being today approached as consumers or users.

Changing Audiences: The E-listener

Radio content is now produced, accessed online and made available through streaming, download and podcast. It is the combination of FM terrestrial broadcasting with online streaming that gives the listener the ability to choose between platforms - broadcast/FM or stream/web - and content formats: if listening to FM broadcast, sound is the only available content. If using the website, the sound is available (on stream, archived files or podcast); but it is also possible to read or watch a video.

E-listeners are FM listeners and online listeners, depending on their preferred platform (or interaction). Understanding of radio listening patterns can be approached through the platform of listening: therefore, regardless of age (a variable used in audience ratings and often used in empirical audience research to analyse media preferences) I consider online listeners to be those who primarily use Internet-based technologies to listen to radio. They are in most cases relatively expert with technology, intensive web users, take part and are active members of social networks and keen into music and new forms of entertainment search. The FM listener, who is also an online listener, is mostly a follower of technology, a convenience web user, listening to online radio for comfort and following, online, the radio station they listen to in FM; they also take part in social networks.

Radio today is multimedia, multi-platform and convergent. It differs from the "ordinary FM" it has sound and image, is (more) interactive, (more) participatory, shareable, asynchronous, repeatable, reproducible, searchable, customizable, discontinuous, hyper-textual, not linear, convergent, and on demand. All these, I believe, are strengthening radio's capacity to create feelings of community among listeners, feelings which can only increase as radio increasingly bets on the cloud paradigm.

Radio may be a new concept, that is, radio as it is, approaching new media forms: by restoring traditional radio's best characteristics, radio turn out to be more interactive (using available online tools and prompting the exchange of information at an interpersonal level), and more participatory (allowing listeners to get involved in group and establish social interactions. Then,

by engaging listeners in formal interactions, involvement may result in participation as an effect of interaction.

Until broadcasters decide to fully integrate their approach to on-the-cloud radio, radio business will remain audio plus engagement: a radio station engages through content (which should be relevant), advice (people's likes, tweets and re-tweets, as well as comments and shares in social network sites) and trust, since broadcasters have to become an online brand that listeners trust the most and use to manage their online web surfing. The tipping point that will make the change for media and, in particular, for radio broadcasting is the conversation that today, interactive tools and social networks allow to arise between radio listeners and radio stations: more than just producing and distributing web content, radio broadcasters must now relate to web users, as they will, through sharing tools, talks and opinions that they provide, spread the message of the radio station, pass on a particular content to make it viral, evangelizing others in a virtual process of word-of-mouth.

Conclusion

As consumers, we carry out different functions in society and we are able to position ourselves at the same time as participant, producer and costumer, in an engaged community. Therefore, it is better to look at all of those that may be part of a radio station's target as being part of the equation: creating content to which your radio station can relate to, by the conversations on weblogs and social sites that influence people, based on their author's credibility and affinity.

As a communication and interaction platform, the Internet integrates public and private spheres, social and interpersonal contexts, information or entertainment interactive contents, as an instrument of socio-cultural change. Radio broadcasting has improved radio listening by adding online interactive tools and multimedia features, and crossing social borders through presenters and interaction with people on social networks. Nevertheless, radio could combine broadcasting with narrowcasting, developing an intelligent radio broadcasting interface with content accessible through mobile devices. While still in the early stages of research and development, cognitive radio (that is, a form of transceiver which automatically detects and adjusts to newly available channels) is a highly promising communications paradigm with the ability to effectively address the spectrum insufficiency problem.

Recommendations

(i) Creating 'on-the-cloud radio' will provide an intelligent radio interface for all digital devices thus providing a multi-platform context that influences listeners' choices and aspirations.

(ii) Radio broadcasters must also widen their understanding of how students relate with radio and devices to develop integrated multi-platform programming strategies such as; forms of webcasting, hyperlinks, podcast and so on.

(iii) The multiplication of media distribution systems and resources implies new broadcasting strategies and a redefinition of content, adjusting it to mobile devices, for an in-home and out-of-home, live and time-shifted consumption. These allow new forms of audience engagement with media within and across all the platforms, which means that, for radio, audio devices will be combined with screens for online, mobile and emerging platforms.

(iv) In this increasingly connected world, this proposal of r@dio sets radio broadcasting in the context of a unique strategy for teaching and learning in schools.

(v) By combining these different approaches, there will emerge a user interface for smart phones and tablets (as well as laptops), using cognitive radio communications for

effective teaching and learning in schools: This interface may combine these services with other multimedia features available on social media such as the Facebook and WhatsApp. even though there are enough applications for audio and radio listening.

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ATTITUDE OF CHEMISTRY TEACHERS TOWARDS THE USE OF STRUCTURED TEXT APPROACH IN TEACHING CHEMICAL EQUILIBRIUM

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Abstract
The study investigated the attitude of teachers towards the use of structured text approach in teaching chemical equilibrium to senior secondary two chemistry students of Keffi metropolis in Nasarawa state Nigeria. Survey research design was employed in the study. The population of the study comprised all graduate chemistry teachers of public and private senior secondary schools in Keffi metropolis. Stratified random sampling technique was applied in selecting the sample for the study. Three public and three private senior secondary schools were randomly selected out of the 15 senior secondary schools in the Area under study. Consequently, five teachers from each school formed the sample of the study; thus, a total of 30 respondents out of the population of 45 are used for the study (6 x 5 = 30). Structured Text in Chemical Equilibrium (STCE) and Structured Text Approach Attitude Questionnaire (STAAQ) were the instruments used in the study. 30 copies of Structured Text Approach Attitude Questionnaire (STAAQ) were distributed to the respondents and 30 filled were collected. Simple percentage statistical technique was used to answer the research question and Chi square was used to test the postulated null hypothesis. The major finding was, the attitude of chemistry teachers towards the use of Structured Text Approach to teach chemical equilibrium was positive. Based on this finding, it was recommended that, Chemistry teachers should make efforts to incorporate in their teaching, standard Structured Texts in other topics that are considered difficult to teach.

Keywords: Attitude, teaching, structured text approach, teachers, chemical equilibrium

Introduction
Structured text approach is a teaching method for teaching difficult topics like chemical equilibrium, where a printed study guide prepared by the researcher, which has been systematically planned and arranged to meet some identified needs in teaching and learning processes was used. The printed guide called, the structured text consists of a set of questions, notes in outline form, visual materials, explained terminology, exercises, experiments, activities and a response sheet. The package describes what the students are expected to do (they do it alone, the teacher is only a monitor); it simplified the concepts and propositions necessary for understanding chemical equilibrium at the secondary school level. The content was divided into four lessons; lesson one deals with the meaning of chemical equilibrium, lesson two deals with the conditions for chemical equilibrium, lesson three deals with the changing of volume or pressure of gaseous system of chemical equilibrium, and lesson four deals with applications of chemical equilibrium with an exercise at the end based on what was presented and the students were required to answer the exercises. The second part of the text consists of questions about the entire presentation. These questions were intended to direct the students to the key ideas and a means by which students could assess their understanding of the topics. The last section consists of responses to the exercises kept by the teacher to serve as a

feedback by which the students could cross-check their understanding. Thus, the teacher can check performance and relate it to the students' achievement, hence, promoting a review of difficulties in the presentation.

The role of teachers in teaching of Chemistry has precipitated a variety of studies over time and will no doubt continue to do so. A study by Abdullahi, Boli, Allen and Payne (2014), explored the reasons why this is so. Their exploration sought reasons as resulting in the differences in attitudes towards Chemistry (by teachers and students), diligence, perseverance, poor instructional material, inadequate teachers' approach to the material and teachers' scientific expertise in teaching were a very important consideration.

Chemistry teaching at senior secondary level needs the teacher to have manipulative and experimental skills to make him/her competent and confident in conducting experiments and/or researches, and at the same time arousing and maintaining interest of students in the subject. The relevance and importance of Chemistry amongst the science subjects is formidable, hence the need for proper teaching of the subject in the secondary schools (Wandersee & Griffard, 2012). Therefore teachers should be concerned with the use of a variety of methods and procedures. Coomb, 1993; Duncan, 1996; Nelson & David 1993; Berry, 2016, and Marcus, 2017 pointed out, that the most enjoyable aspect of teaching and learning can occur when a variety of teaching methods are used.

In order to make teachers develop positive attitude towards the teaching of chemistry, researchers have adopted several approaches, among which are guidance and counselling method (Herron, 1984), specific teaching of problem solving skill (Reif,2003; Grace, 1976; Juan, 2007 & Richard,1992), the classroom interactive approach, audio-tutorial approach, programme - Structured Text (Ali, 1984 & Shuaibu,1998), structured text strategy (Kausali & Andrea (2017) . In spite of these measures however, the attitude of teachers towards teaching of some concepts in chemistry still persists. This is evidenced by the poor performance of students in the core sciences in West African Examination Council (WAEC, 2012).This revelation calls for continuous research into ways of eliminating difficulty in the teaching of difficult concepts in chemistry. (Van & Gaber, 2012).

Among all the chemical concepts, chemical equilibrium is considered the most difficult to teach and learn (Adigwe, 1993). This was supported by Van & Gaber (2012) who stated, that in the science secondary school curriculum, chemical equilibrium is considered the most difficult to conceptualize.

Since the responsibility of the class teacher is to help students attain maximum achievement in their learning tasks, several competencies are expected of this teacher in order to achieve this goal. Some of the competencies include ability to use appropriate instructional strategies in teaching. It is clear that many of the traditional approaches to teaching used in the past are no longer adequate to support the present education system (Eliks & Byers 2010). Gone are the days when education should be teacher-centered, now it should be centralized on learners in order to achieve optimal result. (Clow, 2011).

It can be assumed that, if teachers have the right strategies of teaching and apply them well, they can achieve high in their learning objectives and have a positive attitude towards the used strategies. It is therefore important to note that, science teaching in schools should be dynamic

and reflect current advancement hence, continuous research on issues related to science teaching and learning of which this study was one. Therefore, for teaching and learning to be effective, it is necessary to develop and apply advanced strategies as the researcher's structured text approach, so as to make it learners-centered with the development of positive attitude to different strategies of teaching

Research Questions
What was the attitude of chemistry teachers towards the use of Structured Text Approach to teach chemical equilibrium?

Null Hypothesis
Attitude of chemistry teachers towards the use of Structured Text Approach to teach chemical equilibrium is negative

Methodology
This study investigated the attitude of chemistry teachers towards the use of Structured Text Approach to teach chemical equilibrium to senior secondary two (SS II) chemistry students of Keffi metropolis in Nasarawa state Nigeria. The study employed survey research design. The population of the study comprised all chemistry teachers of public and private senior secondary schools in Keffi metropolis of Nasarawa state. The sample for the study is 30 out of the 45 population. The sampling technique used in selecting the sample population for the study was the stratified random sampling technique. Three public and three private senior secondary schools were selected out of the 15 senior secondary schools of the study area and 5 teachers from each of the selected school. Thus, a total of 30 samples are used for the study; (6 x 5 = 30). Structured Text in Chemical Equilibrium (STCE) and Structured Text Approach Attitude Questionnaire (STAAQ) were the instruments used in the study. The instruments were validated by panel of experts; 2 experienced secondary school teachers of Government Science Secondary School Kofar Hausa Keffi and 3 university lecturers from Nasarawa State University Keffi. Cronbach's alpha was used to ascertain the internal consistency of the instruments which yielded 0.86 and 0.88 respectively. The Structured Text in Chemical Equilibrium (STCE) was used by the teachers to teach the students the four lessons contained in the package. After the four lessons were taught by the teachers, they were given the Structured Text Approach Attitude Questionnaire (STAAQ) to fill. The obtained data from the Structured Text Approach Attitude Questionnaire (STAAQ) were analysed using Chi – square test at 0.05 confidence level to determine the chemistry teachers' attitude towards the use of structured text approach to teach chemical equilibrium.

Results
The data obtained was analysed and is presented in the order of the research question asked and the formulated hypothesis for the study.

Research Question
What was the attitude of chemistry teachers towards the use of Structured Text Approach to teach chemical equilibrium?
The data and analysis that answered this research question is presented in table 1

Table 1: Percentage Scores of Respondents to the Attitude Scale Questionnaire

S/no	Item	Agree		Disagree	
		N	%	N	%
1.	When taught with Structured-Text material, I found chemical equilibrium concept very easy to teach	28	93.33	2	6.67
2.	Chemical equilibrium concept is easier to teach without Structured Text Approach	4	13.33	23	76.67
3.	Chemical equilibrium concept is very difficult to teach with Structured-Text Approach	5	16.67	25	83.33
4.	Structured Text Approach will make teaching of chemistry easy to teachers	20	66.67	8	26.67
5.	After teaching with Structured Text material and using the Structured Text Approach, I developed a positive attitude towards teaching chemical equilibrium	26	86.67	1	3.33
6.	Studying chemical equilibrium with Structured Text material create difficulty for the students	6	20.00	24	80.00
7.	Chemical equilibrium is a very difficult topic to teach in chemistry no matter the approach or method used	5	16.67	25	83.33
8.	Studying chemical equilibrium with Structured Text material makes it easy for the students	24	80.00	6	20.00

N = 30

Null Hypothesis

Attitude of teachers towards the use of Structured Text Approach to teach chemical equilibrium is negative

Table 2: Results of the Chi- Square Analysis of Attitude Scale Questionnaire Responses

S/No	Item	Agree	Disagree	χ^2_{cal}
1	When taught with Structured-Text material, I found chemical equilibrium concept very easy to teach	28	2	10.64*
2	Chemical equilibrium concept is easier to teach without Structured Text Approach	4	23	6.89*
3	Chemical equilibrium concept is very difficult to teach with Structured-Text Approach	5	25	6.90*
4	Structured Text Approach will make teaching of chemistry easy to teachers	20	8	2.33
5	After teaching with Structured Text material and using the Structured Text Approach, I developed a positive attitude towards teaching chemical equilibrium	26	1	10.96*
6	Studying chemical equilibrium with Structured Text material create difficulty for the students	6	24	5.62*
7	Chemical equilibrium is a very difficult topic to teach in chemistry no matter the approach or method used	5	25	6.90*

8	Studying chemical equilibrium with Structured Text material makes it easy for the students	24	6	5.00*
	Total	118	114	55.24

*Significant at 0.05 df = 2-1= 1 Average χ_{cal}^2 = 6.90 χ^2_{cri} = 3.84

Table 2 shows the various chi-square values calculated. The total chi-square calculated is 55.24 and the average is 6.90 at 0.05 significance level. Since the average chi - square calculated of 6.90 is greater than the chi-square critical of 3.84, it is interpreted to mean, that the attitude of chemistry teachers towards the use of Structured Text Approach to teach chemical equilibrium was found to be positive therefore, the null hypothesis of attitude of chemistry teachers towards the use of Structured Text Approach to teach chemical equilibrium is negative is rejected. Rejecting the null hypothesis means, the attitude of chemistry teachers towards the use of Structured Text Approach to teach chemical equilibrium was positive.

Conclusion and Recommendations

From the finding of the study, it is hereby concluded that the attitude of chemistry teachers towards the use of Structured Text Approach to teach chemical equilibrium was positive. The attitude of chemistry teachers towards the used Structured Text Approach to teach chemical equilibrium found to be positive was, probably due to the interactions the students and the teachers had with the learning materials. The students became curious in the materials they were handling, and were eager to learn. They got immediate feedback of what they were doing. With curiosity in the minds of the learners, learning and teaching became easy. The finding of this study regarding attitude of the chemistry teachers towards the used of Structured Text Approach to teach chemical equilibrium is in agreement with the findings of Belinda Soo-Phing TEOH, and Dr.Tse-Kian NEO (2007). They stated that interactive learning using Web-based approach environment is feasible and is a viable alternative to the traditional classroom which has proved to be limited in achieving the necessary needs of the teachers in the modern learning context. Also Kausali and Andrea (2017) supported the finding. They said, teachers were positive towards active teaching and were confident in enforcing self-paced strategy when the environment is structured. This is a viable learning strategy and should be encouraged by educationists. Also, the positive attitude of chemistry teachers towards the Structured Text Approach enjoy the support of Gwyn (2006, 2009), Berry, (2016), and Marcus, (2017) who said that teachers exhibited positive attitude towards working in an interactive environment. This 'success' possibly is due to the comfort they felt in having control over the teaching and learning experiences. In conclusion, it is very important to keep the continuity of development in active teaching and learning based on constructivism, and encourages teachers to apply them in their classes.

Based on the finding, the following recommendations are made:

(i) Chemistry teachers should make efforts to develop and incorporate in their teaching standard Structured Text

(ii) Structured Text Approach should be used for instruction on chemical concepts in general.

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EFFECT OF COLLABORATIVE INSTRUCTIONAL STRATEGY ON SENIOR SECONDARY SCHOOL STUDENTS' ACHIEVEMENT IN BIOLOGY IN BENUE STATE, NIGERIA

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Abstract
This study investigated the Effect of Collaborative Instructional Strategy (CIS) on Senior Secondary School Students' Achievement in Biology in Benue State, Nigeria. Its design was quasi-experimental. Its population was 16,322 Senior Secondary School II students of 301 government grant-aided secondary schools in Benue State. A sample of 366 students randomly selected from 2 schools from each zone of the three zones was purposively selected. A school in each zone was assigned to control group and the other to experimental group. Two research questions guided the study and two null hypotheses were tested at 0.05 level of significance. Students Biology Achievement Test (SBAT), a researcher-developed instrument validated by experts was used. Cronbach alpha co-efficient of 0.85 was obtained for reliability of SBAT. Mean were used to answer research questions while ANCOVA was used to test the null hypotheses. Result showed that students taught using CIS had significantly greater mean achievement score than those of Traditional Lecture Method (TLM); and there was no significant difference in mean achievement scores due to gender of students taught using CIS. Thus, CIS was more effective and gender friendly than TLM in enhancing students' achievement. It was recommended among others that training be organised on use of CIS for Secondary School Biology teaching and learning
.

Key words: Biology Achievement, Instructional Strategy, Collaborative Instruction.

Introduction
The quality of education especially in science and technology given to the citizenry has effect on the growth and development of every nation. Education according to Dienye (2004) occupies the most important position in Nigeria's struggle and the world in general for national development. The Federal Republic of Nigeria in her National Policy on Education (FRN, 2014) emphasized the teaching and learning of science at all levels of educational system across the country.

Biology is one of the major subjects in Nigerian school curriculum because it is the science of life. According to NCCE (2008), the philosophy behind the subject is to produce knowledgeable, highly motivated, professional and effective teachers of Biology who will be able to develop in students an appreciation and understanding of biological process and principles. In every society, the knowledge of Biology is essential because it helps man to meet its basic needs in every area of life.

Teaching provides an avenue for teachers to showcase their skills and knowledge of subject matter to the students. Teaching according to Agbulu (2013), is a systematic presentation of facts, skills, ideas and techniques to students. The teacher should engage relevant instructional strategy in teaching. Instructional strategy is the strategy of organizing the instructional content and materials, mode of presentation to the students which specify the activities of the teacher

and students in order to attain the stated objective (Adejoh & Apochi, 2013). Instructional strategy thus, enables learners to acquire good knowledge of subject matters.

Achievement is a reward for meeting a required objective. Achievement according to Abakpa (2011) is the measurement of accomplishment in a specific field of study. Ogundokun & Adeyemo (2012) reported that achievement of students in school setting refers to exhibition of knowledge attained or skills developed in a school subject indicated by test scores or marks assigned by teachers.

Collaborative teaching involves a group of students working together to solve problems and complete a task. Emily (2011) stressed that collaborative teaching is a situation in which two or more people learn or attempt to learn something together and more specifically as joint problem solving.

The issue of gender is also a very important issue in the teaching and learning of Biology. Okoro (2011) opined that the instructional method used in classroom may influence gender and students' achievement in science. He stressed that the female performed better than males when collaborative learning strategy is used. On the other hand, when competitive or individual learning strategy was used males did better than the females. Claims like this necessitated this study which is focused on finding out the effect of collaborative teaching method on achievement in secondary schools in Benue State.

The knowledge of Biology as an essential subject provides learners a solid foundation for various fields such as genetics, biochemistry, physiology, ecology. According to Nwakonobi (2008), the subject enables man to address problems of food scarcity, pollution, diseases, family life management and conservation of natural resources. In spite of the importance of Biology noted above, the achievement of students in Biology at senior secondary school level has been consistently poor over the years. For example, the West African Examination Council (WAEC) Annual report shows that less than 50% of candidates passed Biology at credit level and above since 2013-2017. According to Boujaoufe and Attich (2008) the teaching methods adopted by teachers do not make the learning of Biology easy for students. Similarly, Oloyede (2010) identified that the method used by teachers for teaching science contributes to students' poor achievements in science subjects such as Biology. Both agreed that the prevailing teaching practices do not actively involve the learners in the learning process and seem to deprive the learners of taking charge of their learning thus affecting their performances in examinations.

Akwaqah (2008) opined that the traditional methods are guilty of imposing poor concept formation and reducing the interest thereby leading to poor achievement among science students. This calls for the need to investigate the use of collaborative instructional strategy which is one of the contemporary teaching methods that could help to increase students' achievement in Biology concepts.

Statement of the Problem

There is growing concern among science educators and other stake holders about the under achievement in Biology as reported in WAEC Chief Examiners Report. Omoshehin (2004) reported that these problems may not be rooted in the method of instruction only but the way students are taught may perhaps greatly affect their performance. Similarly, Njoku (2005) attributed the poor performance to the use of traditional teaching method (lecture) referred to

as 'talk and chalk method' in teaching Biology with no activities thereby make the concept difficult for students to grasp. Biology like other science subjects cannot be taught in abstract, students need to conduct themselves in a group and exchange ideas on any given concept in collaborative situation for them to understand better. It is in view of this, therefore, that this study to investigate the effect of collaborative instructional strategy (CIS) on senior secondary school students' achievement in Biology in Benue State, Nigeria was undertaken.

Purpose of the Study

The main purpose of the study is to investigate the effect of collaborative instructional strategy (CIS) on senior secondary school students' achievement in Biology in Benue State, Nigeria. The specific objectives are to:

(i) Determine the effect of collaborative instructional strategy on students' achievement in Biology; and

(ii) Determine the effect of collaborative instructional strategy on male and female students' achievement scores in Biology.

Research hypotheses

The following two null hypotheses were formulated and tested at 0.05 level of significance.

(i) There is no significant differences in the mean achievement scores of students taught Biology using collaborative instructional strategy and those taught using lecture method.

(ii) There is no significant difference in the mean achievement scores of male and female students taught Biology using collaborative strategy.

Methodology

A quasi experimental design of non-equivalent group was adopted. Students Biology Achievement Test (SBAT) was developed and administered to 366 samples drawn from 16,322 populations of Senior Secondary School II students using simple random sampling. The instrument (SBAT) was validated by three experts and a Cronbach alpha level of 0.87 was established for its reliability. The experimental group was taught using collaborative instructional strategy of teaching while the control group was taught using traditional lecture method of teaching. The experiment lasted three weeks. Data for the research questions were analyzed using descriptive statistics of means and standard deviation, while the null hypotheses formulated were tested at 0.05 level of significant using ANCOVA.

Results and Discussion

This chapter presents results of the data analysis and discusses the findings of the research. It was carried out under descriptive analysis, testing of hypothesis, and discussion of findings.

Research Question 1

What is the mean achievement scores of the students taught Biology using Collaborative Instructional Strategy of teaching and those taught using Traditional method?

Table 1: Mean Achievement Scores and Standard Deviations of Students Taught Biology with Collaborative Instructional Strategy and Those Taught with Traditional Lecture Method

Groups	N	Pre-test		Post-test	
		Mean	SD	Mean	SD
Traditional Method	184	58.18	8.204	54.09	9.331
Laboratory Method	181	58.71	9.064	65.94	7.952
Mean Diff.		0.53		11.85	
N Total	365				

Source: Field Work (2018).

The result of the mean achievement scores of the students taught Biology using Collaborative Instructional Strategy of teaching and those taught using Traditional method is presented in Table 1. The result showed that in the pre-test, the control group (traditional method) had a mean score of 58.18, while the experiment group (Collaborative Instructional Strategy) had a mean score of 58.71. The mean score difference between the two groups is 0.53 and this shows that both groups had about the same level of entry behavior or quality. The result also showed that in the post-test, the control group had a mean score of 54.09, while the experimental group had a mean score of 65.94. The mean score difference between the two groups is 11.85 and this shows that the experimental group had a higher mean achievement score.

Research Question 2

What is the mean achievement scores of the male and female students taught Biology using Collaborative Instructional Strategy of teaching?

Table 2: Mean Achievement Scores and Standard Deviation of Male and Female Students Taught Biology with Collaborative Instructional Strategy

Groups	N	Pre-test		Post-test	
		Mean	SD	Mean	SD
Male	98	62.42	7.376	66.38	8.191
Female	83	53.32	8.597	65.29	7.599
Mean Diff.		9.1		1.09	
N Total	181				

Source: Field work (2018).

The result of mean achievement scores of the male and female students taught Biology using Collaborative Instructional Strategy of teaching is shown in Table 2. The result showed that in the pre-test, the male students had a mean score of 62.42 and a standard deviation of 7.376, while the female students had a mean score of 53.32 and a standard deviation of 8.597. The mean score difference between the two groups is 11.85 and this shows that both groups were at different cognitive level before the application of treatment. The post-test result showed that the male students had a mean score of 66.38 and a standard deviation of 8.191, while their female counterpart had a mean score of 65.29 and a standard deviation of 7.599. The mean

score difference between the two groups is 1.09 and this shows that both groups were almost at the same cognitive level after the application of treatment.

Research Hypothesis 1

There is no significant difference between the mean achievement scores of students taught Biology using collaborative teaching method and those taught using traditional teaching methods.

Table 3: Analysis of Covariance of Academic Achievement Scores of Students Taught Biology with Collaborative Instructional Strategy and Those Taught with Traditional Method

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	13911.983[a]	2	6955.991	92.723	.000
Intercept	24980.293	1	24980.293	332.987	.000
PreTest	222.518	1	222.518	2.966	.086
Groups	**13569.239**	**1**	**13569.239**	**180.878**	**.000**
Error	29032.276	387	75.019		
Total	1441789.000	390			
Corrected Total	42944.259	389			

Source: Field work (2018).

The result of the Analysis of Variance in Table 5 shows p-value of 0.00 which is lower than the 0.05 level of significance for the study. This shows that the test is significant. This implies that there is a statistically significant difference in the mean achievement scores of students taught Biology using collaborative instructional strategy and those taught using traditional teaching methods. Therefore the null hypothesis of no significant difference is rejected.

Research Hypothesis 2

There is no significant difference between the mean achievement scores of male and female students taught Biology using laboratory teaching method.

Table 4: Analysis of Covariance of Academic Achievement Scores of Male and Female Students taught Biology with Collaborative Instructional Strategy

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	141.703[a]	2	70.851	1.122	.328
Intercept	12787.290	1	12787.290	202.468	.000
PreTestExp	87.312	1	87.312	1.382	.241
Gender	**3.178**	**1**	**3.178**	**.050**	**.823**
Error	11873.544	188	63.157		
Total	842428.000	191			
Corrected Total	12015.246	190			

Source: Field work (2018).

The result of the Analysis of Variance in Table 6 shows p-value of 0.823 which is higher than the 0.05 level of significant for the study. This implies that there is no statistically significant difference in the mean achievement scores of male and female students taught Biology using Collaborative Instructional Strategy. Therefore, the null hypothesis of no significant difference was not rejected.

Discussion of Findings

The finding of the study revealed that a significant change was found in the academic achievement scores of students taught Biology using Collaborative Instructional Strategy and those taught using the traditional method of teaching. The students taught using Collaborative Instructional Strategy of teaching performed better in achievement than those taught using traditional teaching methods. This implies that Collaborative Instructional Strategy is a more efficient way of teaching Biology than the traditional teaching method. The finding is in agreement with Wambugu and Changeiywo (2008) who viewed that teaching methods affect the academic achievement of students.

It was found by the study that male students performed better than the female students although the difference was not statistically significant. This finding is in
agreement with Archer and Macrae in Iwuji (2012) who stated that male students appear to achieve higher than the female students, and that boys are better than girls at activities requiring manipulation (psychomotor skills). The finding of the study is also supported by Oakley in Iwuji (2012) who opined that right from childhood, a boy traditionally receives more training and encouragement for achievement than girls.

Conclusion

It can be concluded that the method employed in teaching Biology has significant effect on students' achievements as both male and female students gained significantly and retained more skills when taught using collaborative instructional strategy of teaching. Therefore, it is concluded that collaborative instructional strategy is an effective and result-oriented method of teaching especially in pure science subjects.

Recommendations

Based on the findings of the study, the following recommendations are made:

(i) The Collaborative Instructional Strategy should be employed in teaching Biology at the secondary school level.
(ii) Trainings on the use of collaborative teaching strategy should be organized for Biology teachers.
(iii) Students should be helped to develop the culture of employing collaborative strategy in their studies.

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EFFECTIVE COMMUNICATION AND UNIVERSITY ADMINISTRATION

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Abstract
Communication is central to human life and takes place all the time. This paper looks at the nature, elements and types of communication with a particular emphasis on organizational communication. Specifically, the paper examines how communication can be deployed in the university system to achieve effective administration. Elements of communications as they apply to university administration and the choices available to the university administrator are highlighted; instruments of communication that are available to the administrator and their appropriateness as to the situations are analyzed; the different segments that make up the university's publics are outlined; and factors that constitute noise, thus detracting from effective communication and the attainment of set goals are looked into. The paper emphasizes the importance of understanding the nature of communication, choosing appropriate channel depending on the public and situation, and minimizing noise for effective and efficient university administration.

Keywords: Communication; Organizational communication; University administration

Introduction

Communication is such a common word that virtually everyone is sure about its meaning. To some, speaking and writing is what is meant by communication. Communication is speaking and writing; but it is more than speaking and writing. Communication is the process through which we give and/or share feelings, ideas, attitudes, thoughts and beliefs. These are passed / exchanged in the form of a message. In this process, messages shared/given are interpreted to give them meaning so that understanding can be achieved.

Types of Communication

Basically, there are two types of communication: the verbal and non-verbal forms of communication.

Verbal Communication: The form of communication involving the use of words in whatever way is called verbal communication. In other words, if the giving or sharing of a message or messages involves the use of words, that communication is verbal communication.

We have two categories of verbal communication, the ORAL and the WRITTEN. When you speak, make conversation, hold discussions or make a speech, whenever you articulate sounds to pass a message, you are engaged in oral communication. On the other hand, you engage in written communication by committing words to paper. In written communication, you organize in print alphabetic symbols into meaningful units called words, arranged in a manner as to convey messages between communication participants. As pointed out earlier, written communication involves the use of putting words on paper, that is, PRINTING words so that

meaning is extracted by LOOKING at, by SEEING words and assigning appropriate meaning to them.

Non-verbal Communication: Verbal communication which is the use spoken words and writing is the popular meaning of communication and is often equated with communication. Non-verbal communication is the other form of communication but is not well known or commonly understood. Any form of communication that does NOT involve the actual use of words to exchange messages or pass information is known as non-verbal communication.

Part of non-verbal communication is the use of gestures. This is the movement of parts of the body, especially the head, expressions on the face, the hands etc. to express oneself or pass a meaningful message. Non-verbal communication is an integral part of communication. You sometimes pass a message without speaking. You move your head up and down quickly to indicate agreement. You move it horizontally left to right or right to left, to indicate objection. You smile to indicate you are happy. In class, you raise your hand to signal that you want to speak. The expression on your face can communicate your boredom, interested, tiredness etc. It is therefore very important to note that we communicate with more than words. In fact, sometimes what we do not speak/write out communicates a lot. Non-verbal communication is therefore a vital component of communication.

Communication as a Process

A process is something that is ongoing (not static), continuous, dynamic and ever changing. The point was made that although speech and writing is communication, it is not limited to the two; that non-verbal communication is an integral part of communication. In other words, when you speak/write, you are communicating; when you DO NOT speak/write, you ARE still communicating. When you do not speak you may be communicating the fact that you do not have anything to say.

Communication as a process has no point of beginning, no point of termination. It goes on all the time in a continually changing environment, situation and relationships. For instance, even sleeping deeply may communicate exhaustion. Hurrying up and singing to yourself while getting ready to attend a meeting, may communicate that you are looking forward to the meeting. Your manner of dressing and the distance you maintain from each other when holding discussions, are important aspects of non-verbal communication. Once we realize that communication consists of more than words, the nature of communication as a process becomes easier to understand.

Elements in the Communication process

It has been noted that communication is a process, an activity that goes on all of the time. However, to study communication it has been necessary to freeze, to 'pause' this process, then break communication into parts, otherwise known as the elements of communication. Communication is successful when one has a message to send, actually sends the message to another person, which the person receives and understands correctly. It is important that what one intends in a message is correctly understood when the message is received and interpreted.

Anything that interferes with the correct understanding of a message, anything which distorts the message or makes the message unclear is referred to as NOISE.

What then are the elements involved in the communication process? Generally, the following elements make up the communication process: the Sender, the Message, the Channel, the Receiver and the element of Feedback.

Sender The person that has an idea, an opinion, thoughts, feelings etc. that he wants to pass on; the person that has the message that he wants to send to another person is called the Sender. It has been stated that communication is a process. For convenience and ease of understanding, the sender is the initiator of the communication event. He is in communication with himself and his environment. He chooses a message, among many, encodes the message appropriately, which he then sends.

Encoding the message entails putting the message into appropriate sounds and articulating the words out, using your vocal cords if you are your message using speech. However, if you are using writing to pass your message, encoding means putting your message into suitable words which are committed to paper/print. The Sender is thus the one that initiates the communication event.

Message: The Message as an element of the communication process is simply that which the Sender has to say/write or convey. The idea, attitude, opinion, information, instruction etc. that the Sender wants to pass on or convey is what is referred to as message. It can be said that Message is the heart of communication. Whether communication is successful or not depends on if the Sender encodes the idea/information correctly such that the message actually carries the idea/information he meant to pass on. The other side of it is the person the message is meant for must assign to the message the meaning that the Sender intends.

Channel: How does the message that the Sender has get to the person intended? What is the means used to get the message across? The simple answer is that the Sender uses a channel as a means, as a way of getting a message across. In a face to face situation, airwaves carry sounds which are then perceived by the ears. When you write a letter, the post carries the letter to the person intended. The airwaves and the post are thus channels. In this age of advanced information technology, the internet is the channel through which messages are sent using the computer.

Receiver: The Receiver is the element in the communication process that the message is targeted at. The Receiver is the person for whom the message is meant. He is the final destination of the message. As alluded to earlier, until the Receiver gets the message, interprets it and assign the meaning that the Sender intends in the message, successful communication has not taken place. In a face to face situation, the person you are talking or passing information to is the Receiver. When you write a letter or memo, the addressee is the Receiver. In the communication process there is always a Receiver, even if the communication is directed at oneself.

Feedback: Feedback in the communication process is the element that enables you to know if your message was received and understood. It is the response you receive to your message. A response could be a reply. A lack of reply is also a feedback. You could greet someone and be deliberately ignored by that person for any number of reason. Whatever the reason is however, the lack of reply indicates that the person is not happy with you. So, not replying is a feedback. If you pass a message for someone to do a particular thing in a particular way, the doing of that thing in that particular way is feedback that the message is understood. The element of feedback is what highlights the fact of communication as a process.

Noise: an important concept in communication is noise. Again noise is understood in communication as much more than the physical noise that interferes with hearing clearly what is said. Noise is anything that distorts a message and makes understanding it difficult thereby impeding effective communication. Noise could occur in any of the elements. When the sender uses inappropriate language, it is noise; too many messages in a channel can constitute noise; if the receiver is tired or hungry or distracted by other things that is noise. The way you dress, if it distracts, can constitute noise. So noise can be within or outside so long as it is something that impedes effective communication

Communication Categories

Communication takes different dimensions and is in various categories. Some of these categories include intrapersonal communication, interpersonal communication, mass communication and organizational communication.

Intrapersonal communication takes place within individuals as thoughts, contemplation and consideration. It is a sort of internal dialogue within the individual. At times these ideas, thoughts or messages are expressed out to others, at other times they are not – they are kept within the individual. It is these internal dialogue, or monologue if you like, that is referred to as intrapersonal communication.

Interpersonal communication is concerned with the communication process between two individuals or a very small group, involving sending and receiving messages instantaneously, usually in a face to face situation where immediate feedback is possible and almost certain. Communication at this level is personal, oral and the rate at which messages are exchanged is high. Most of our daily communication is interpersonal communication. Indeed a very high proportion of all communication is interpersonal communication.

Mass communication is the use of mass media instruments to send out messages. These instruments include the Radio, The print media (Newspapers, Magazines etc.) and the internet. The Receiver or target audience is usually a large number of people, in hundreds of thousands, or millions.

Organizational communication can be defined as the communication processes existing within an organization among its members and the communication taking place between the organization and the larger society in which it is located and from which operates. What is an organization?

Rogers and Rogers (1976:9) define an organization as a "stable system of individuals working together through a hierarchy of ranks and division of labor and with common goals". An

organization can be thought of as a large group of persons controlled by a much smaller group of persons who set the goals for the larger group and steers it to attain these goals.

What sets an organization apart from any collection or groups of persons is communication- the communication of the awareness of the organization's direction, visions and goals. As noted by Hicks (1976:130) "when communication stops, organized activity ceases to exist, individual uncoordinated activity returns".

Organizational communication can be broadly classified into internal and external communication. Internal communication is the communication that takes place within an organization, including the structures put in place as channels for this communication, the direction or flow of the communication and the amount of communication that goes on in an organization.

The structures put in place in an organization- the organization chart for example- determines the formal channels of communication. The chart limits and guides communication flows. Internal communication can be further broken down into **vertical and horizontal** communication.

Vertical communication is communication that goes down from the top, usually from management, to subordinates in the form of instructions, policies, directives, orders, targets, plans, queries, etc. it is also communication going on from the subordinates to the top. This could be in form of reports, assessments, requests and other forms of feedback required by the management.

Horizontal communication is the communication between members of an organization on the same rank, Heads of Sections for example, or between departments. Both vertical and horizontal communication in the explanation above, are formal communication channels. **Formal communication** is official communication, usually passed in writing, and following normal structures or official communication channels.

Informal communication is information exchange mostly at an interpersonal level between colleagues in an organization. It is oral, involving information about the organization's plans, who is being moved where, pending promotions, proposed policies, etc. Information exchanged is not official.

As for external communication in organizational communication, this is communication process occurring between an organization and its external environment. The external environment consists of the larger society, and could specifically be the government and other regulatory authorities, an organization's clients, suppliers and competitors.

An important concept in organisational communication is communication load. This is the amount of communication that occurs in an organization's communication channels, whether formal or informal. In this respect, we have communication overload and we also have communication underload.

Communication overload occurs when there is too much information in the channels and in the organization. For example when directives follow each other in quick succession, when there

are rapid changes in policies, targets etc. such that members of the organization are overwhelmed and left confused.

Communication underload on the other hand is when there is no or little policy explanation and a general lack of information from the management to key stakeholders who are the organization's publics . This can lead to the thriving of informal communication, especially rumors, which may be destructive to the organization's well being. When there is communication underload rumors thrive in that environment. Rumors and grapevine are types of informal communication in organizations. While rumors thrive in an atmosphere of communication underload and is negative and may not have any basis, the grapevine is usually where you get information on impending decisions that have not been formalized. Management may also use it to test for reactions to proposed initiatives.

Effective Communication in University Administration

As we have seen, communication in Universities falls within organizational communication which has been defined by Paveh (2003) as cited in Oluwatoyin (2016:1) as "the ability of one to impart knowledge, pass a rule or an instruction, make a request, transmit or share an idea with a view to ensuring that organizational objectives are attained and individual interests are achieved through mutual understanding".

It is communication that defines and coordinates an organization, it is also communication that will ensure that the mutual interests and objectives of both the organization and the individuals working in that organization are harmonized. In other words, in a university setting, whether the goals and objectives of the University are clearly defined and understood by the employees and whether these align with the interests of the employees is a function of effective communication.

Channels of Communication

Channels of communication in organizations are formalized and can be seen at a glance from the organogram of an organization. In the University System, at the apex is the council, then there is the senate - these are the two decision making bodies in the Nigerian University System. The council is the highest decision making body. The management is headed by the vice chancellor and is made up of deputy vice chancellors, registrar, librarian, and bursar. Then we have the schools and the departments which make up the schools. Vertical information can be downwards from council, the management down to schools, then departments or upwards from departments to schools, to the managements. Apart from these components, we also have the registry under the registrar and directorates and units reporting directly to the Vice-Chancellor's office. Then there are the various senate committees.

Horizontal communication takes place laterally between departments, between schools, and between members of management. So studying an organogram of a university will give you a fair idea of the formal communication channels in that University. However, as indicated earlier, there are other channels of organizational communication that are informal. Communication could also be diagonal, moving from a department or unit level in the University to a school level other than that which the department belongs.

When employees meet on a person-to-person basis holding discussions about the activities of the organization, in this case, the University on personal not official basis, this is referred to as

informal communication. Again, this type of communication is oral involving issues like organizations' plans, who is being moved where pending promotions, proposed policies etc. this is referred to as the grapevine and sometimes even the management uses it to protest attitudes and feelings on proposed policies. The negative informal organization communication is the rumor. This also occurs in person-to-person encounters exchanging information whose origins are not traceable.

Internal and External Communication

It has been noted that, organizational communication can be broadly classified as internal communication referring, for example, to communication that goes on within the University itself among its staff and students, and external communication which is the communication that the University engages in with its host community; with the government at all levels; with its alumni and even potential students and employees; and with the general public. In the University system, the interactions between town and gown are in the domain of external communication.

Types of Communication

Types are used here to indicate the kind of channel through which communication is transmitted from a source to a receiver and through which feedback is obtained. Some of the types or channels used are conducive to information richness and some are not. To engender effective communication organizations, universities inclusive, make an atmosphere of openness in information exchange an imperative to achieve organizational goals. Channels that are information-rich should be preferred except where this is not appropriate to communication objectives. Studies have shown that effective administrators and managers mostly use channels that are rich in information (Allen & Griffeth, 1997; Fulk & Boyd, 1991; Yater & Olikowski, 1992).

Among channels of communication with high information richness are face-to-face conversation, telephone conversation, and videoconferencing. We may not be so advanced in our situation to use videoconferencing, but telephones are common place and face-to-face is natural, involving no technology. These types of channels have high information richness because sender and receiver receive immediate feedback, can clarify matters on the spot and most importantly the communication participants can read each other's facial expressions and body language, and hear tone of voice and adjust and respond accordingly. As had been noted, words are a minor part of communication as most communication that takes place is non-verbal.

Channels with medium information richness include emails, written letters, and memos, and those with low information richness include formal written documents like legal documents and spreadsheets because they are most times rigid and standardized. A good University administrator would have to decide when to use any of the channels. Face-to-face meeting, and telephone conversations may be information-rich but they lack permanence unless taped or transcribed. Information-rich channels are also more suited to convey feelings rather than dry facts. Memos and letters are more appropriate for the purpose of keeping records and conveying weighty issues like directives, policies, and instructions so that there would be no room for doubt. A presentation of the University's budget or any sort of financial statement and presentation of students' results must be done in a spreadsheet using standard formats.

As noted by Barry & Fulmer (2004), for effective communication one must find the appropriate match between the type of communication channel and the communication objective. Faced with the choice between written and oral communication, the University administrator should use written communication in passing on facts, when the information should be on record and filed, when there is no urgency, immediate feedback is not needed and when the message conveyed is complicated. On the other hand oral communication should be used when there is urgency, when immediate feedback is needed, when the message can be simply conveyed and explained and when the issue involves emotions and feelings.

Communication and Administration

So far, we have emphasized these aspects of communication and have applied it to University administration:

(i) Communication in a University, like in all organizations, can be horizontal or lateral; it can be vertical, from the top hierarchy to the employee on the lowest rank – downward communication – or upwards from the bottom up to the highest hierarchy. For effective feedback, communication should be both downwards and upwards. Communication can also be diagonal.

(ii) The university's organogram provides a good idea of the channels of formal communication existing in the University. However, there are also informal channels of communication.

(iii) The effective administrator must choose the type of channel in which to pass a message depending on the goal that the administrator sets out to achieve. Specific aspects of communication in University administrations are now examined.

Specific Communication Instruments

An organization no matter how new has an administrative tradition or adapts on an already existing one. The organization may adopt and improve on this tradition but the core elements remain. As already discussed, what holds an organization or an institution like a University together is simply communication as it gives cohesion and direction to the organization. Without communication there will be only individuals pursuing disparate goals in diverse ways without any unifying vision.

For the effective communication of its goals and to harmonies what may be different components of the organizations and direct them to achieve common objectives, effective organizations devise and maintain various instruments of communication which are standardized. These are in form of rules, regulations, and formats for communication, and even norms of behavior. This section would look at some formal instruments of communication that are devised to preserve organizational memory, to help the organization achieve routine objectives and strategise into the future.

These are basically administrative instrument and they include reports, memoranda, Letters email, short message services (sms), telephone and face-to-face conversation.

(i) **Reports**: Reports have been described by Ezeifeka (2016:130) as entailing "giving factual, objective information on a particular event, action or situation which may include progress made in particular projects and facts needed to guide an organization or a social group on future course of action". The researcher then went on to list some of the Administrative/technical reports to include periodic reports; progress reports, event reports and situation reports. Others are the investigative reports and the minutes

of meetings (Ezeifeka, 2016). It is very important that any administrator, but university administrators especially should note that organizations have formats and templates for various reports whether progress, periodic, investigative or minutes of meetings. While each meeting, each situation and event the administrator is reporting on is unique in itself, the structure of such reports are standardized. The wise administrator is guided by the structure that is put in place by each organization in form of formats and templates. If one is new in an institution, one should call for the appropriate file and study similar reports done in the past. These formats can be improved upon but should not be discarded. Organizations usually review these formats to adapt to changing situations.

(ii) **Memoranda/Letters**: Memoranda (memos) and letters are sometimes used interchangeably. However, for the purpose of this paper memos are formal communication that is designed for internal communication. It usually has a format indicating the source (From:), the receiver, (To:) the subject, reference number and date. It is usually addressed to members of the same organization or routine official matters and is directed at recipient not in his/her personal capacity but in their official capacity. Memos are thus normally filed in subject files. Official letters on the other hand, can be an internal communication or external communication. It is usually addressed to a specific staff of an organization on welfare, training, promotion or disciple and concerns that staff alone. When an organization communicates with parties outside an organization, it is usually done through a letter.

(iii) **Emails**: The email is becoming the first administrative choice for exchanging Information and is assuming more dominance in organizational communication. Organizations now have Local Area Networks to connect all members of the organization apart from the normal internet connection. The implication is that universities, and especially its administrates must be ICT- complaint to keep abreast of modern trends and help the Universities be at the forefront of developments. The strengths of emails include its speed, its capacity for storage of huge records in minute a space and its characteristic of being multi-media. Its weaknesses include the danger of losing huge records without backups; that it is not confidential as anything sent through email can be viewed by anyone sufficiently interested; and the way that it tends to interfere with appropriate and formal manners of communication.

(iv) **SMS:** Short Message Services are text messages sent through the telephone, and are increasingly popular for sending notices and reminders of meetings and other brief official notices.

(v) **Telephone:** This Instrument of communication has always been an important part of organizational communication. As noted earlier, it is one of the channels that has high information richness because of its immediacy, quick feedback and the ability of the communicators to listen and react to tone of voice which is an important, even crucial part of communication. The telephone is used for urgent messages and when immediate feedback is required. It is also used when you want to convey feelings and emotions, and to explain issues that are not complex or complicated.

(vi) Other instruments of organizational communication include **Newsletters** which contain information on current developments in an institution and news concerning the personal lives of staff; **press releases** - an external communication tool addressed to publics outside the institution, and **advertisement** through which the institution buys a space or airtime in the press or electronic media.

This paper has attempted to explain what communication is and discussed essential elements that make up the complex called communication. The most basic of these elements are the sender, the message, the channel or medium, the receiver and the element of feedback. This is in addition to the important concept of noise which has been described as anything impeding the understanding of the message. An attempt has also being made to relate these elements to organizational communication, specifically to communication in the administration of a University.

Administrators are responsible for the smooth running of a University. These administrators are headed by the Registrar who has been described as the statutory secretary to the council and senate committees (Eezeifeka, 2016); and it has been shown that administration is a communication task and understanding the complex nature and manifestations of communication will contribute to effective administration in the University. As Umeasiegbo (2000) points out, the duties of a University administrator includes writing memos, circulars and briefs ahead of committee meetings, acting as secretary to meetings and writing reports of standing and adhoc committees' meetings. He lists other duties to include writing letters and conveying decisions for both internal and external consumption and follow-up actions resulting from committee servicing. All these are basically communication functions. The following is recommended bearing in mind the basic elements of communication.

Recommendations

Adapting from Champoux (1996), the University administrator should be aware of the following challenges that can arise from the elements of communication and how to address them for effective and efficient administration in the University.

(i) **Sender**: As we have seen, this is the person initiating the message. It is important that the sender be conscious of the receiver including his culture and status for choice of language and tone of writing. The administrator should also determine and indicate if feedback is expected; the nature of feedback should be clearly stated in the messages.
It is also necessary that administrators receive formal training and retraining on written and spoken communication (verbal) and other forms of non-verbal communication. It has been emphasized that communication, including organizational communication in universities, is overwhelmingly non-verbal.

(ii) **Message** : At the heart of all communication is the message – whatever it is that is being passed to the receiver. Administrators should at all times make their messages clear, brief, simple and unambiguous. The purpose of your communication is to pass a directive, give instruction, make a report or give information. There is a message you want to pass to the receiver. Effective communication only occurs when what is intended by the sender is what is understood by the receiver. Simplicity is at the heart of effective communication as it reduces to the barest minimum chances of misunderstanding and saves time, thus contributing to efficiency.

(iii) **Medium**: The administer has to decide which media or channel will be the most effective one, written or oral, in passing a particular message considering the university's established channels. It is also important that administrators are aware of how non-verbal communication can be deployed and the situations in which they can be effective. Giving an unruly staff the cold shoulder; passing information through gestures and facial expressions at meetings, trying to interpret the body language, and tone of voice of your superior while he is passing instructions to indicate weight and urgency of

an assignment, all these are non-verbal communication that we use. We should be conscious of them and deploy them as appropriate.

(iv) **Receiver**: University administrators send and receive communication. In receiving communication, knowledge of the sender including culture and status will aid understanding of the message. It is also important to understand the language and practices in the university system to improve listening and interpretation as administration depends on tradition or precedents. This way the administrator will understand the nature, the channels and the feedback loop to be used in responding.

(v) **Feedback**: As indicated, a reply or response to a message is what is commonly understood as feedback. In communication however, feedback is more than this. Lack of response or reply is also feedback. If you know someone has received your message to which he should respond but the person refused to reply, a message is being sent by that person that you should interpret. So in practical terms, administrators should be conscious of the various formal channels of communication as contained in the university's organization chart so as to know who responses to communication are to be directed at, and through which channels to write. Also when there is an upward communication from the lower hierarchy, the administrator should properly direct this communication to the management. Feedback to policies and activities of an organization is very important and it is the duty of the administrator to ensure that the university encourages an open atmosphere for communication. This means that there should be no barriers, whether physical as in keeping distance between superiors and subordinates, or structural as in defective communication with no clear chain of command (Oluwatoyin, 2016) to discourage staff from communicating their feelings and opinions to management.

(vi) **Noise**: This refers to anything that contributes to the distortion of a message thereby impeding understanding. Noise can be physical or physiological or psychological. Noise can exist in the sender, in the message, in the channel and in the receiver. When the administrator is not very clear in his mind about the precise nature of the message he wants to send, or there are distractions in the sender when sending a message, noise exists in the sender and will detract from clarity of message. Use of vague and ambiguous words by the administrator to pass information constitutes noise in the message. When multiple instructions are sent in a single memo, this could constitute noise in the channel. Many directives rapidly following each other can lead to information overload and constitute noise. The receiver's physiological and psychological state can also constitute noise. Hunger, tiredness, sadness all detract from attending to a message.

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RESOURCE SHARING AND THE ROLE OF PUBLIC LIBRARIES IN TIME OF RECESSION IN NIGERIA

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Abstract
In this 21century the availability of ICT facilities bring about the advent of electronic resources and opportunity for resource sharing in our libraries. This paper examined the extent to which resource sharing can meet public demand of information in time of recession. It discussed the societal perspective, factors influencing resource sharing, need for resource sharing, potentials of resource sharing, digital age as a facilitator for resource sharing, conditions for effective digital resource sharing and conclusion.

Keyword: Resources sharing, public, libraries, information, recession

Introduction

In the age of digital evolution and escalating price of electronic information resources resource sharing is important for effective and efficient functioning of libraries. The availability of information in digital format and high costs of journals subscription compel the libraries to work together. Moreover technical advancement provides a platform for digital resources sharing and offer many opportunities for libraries to become more technical and professional.

Furthermore library budget is so meager which affect acquisition of materials and makes it difficult for libraries to provide optimum resources for their users. Isaak as cited in Odogwu (2008) posited that the problems that weaken African libraries include financial constraints, lack of human resources, outdated materials and poor use. Omekwu (2004) maintains that it is difficult for a single library to have all the resources it requires to meet the information needs of its actual and potential clientele due to inability of the government to stock libraries with relevant materials that can contribute to teaching, learning, research and development. He therefore proffers solution through resource sharing.

Resource sharing therefore is a mutual agreement between libraries to exchange resources. Each library gives its own materials to other participating libraries and also receives same from them. It can also be seen as a process by which library resources or networks are made available to the persons entitled to use any of the resources in those libraries. Nwalo (2008) also defines resource sharing as a formal arrangement by a group of organizations that have common interests, to pull their material and human resources together so as to meet clientele needs much more than they could have done if they were to depend on individual efforts. At the beginning, inter-library lending constituted the major aspect of resource sharing but today it embraces many more activities. Oyclucle (2004) identifies the types of sharing as interlibrary loans; joint acquisition; central cataloguing; exchange of library materials; computerized cataloguing schemes; awareness services and joint storage of materials.

Generally, resource sharing is geared towards satisfying the public demand for information by giving the less privileged libraries opportunity to get richer materials from their colleague's. .It is through sharing that those resources or networks of libraries are made available to people who desire them. Sharing therefore makes information available at low cost, reduces frustration of information users and breaks down institutional barriers since librarians identify libraries that have what they need and obtain these resources from them. Exchange of collections, equipment, manpower and experience makes libraries richer and more productive.

Public libraries therefore should improve turnaround time through mail loans directly to patrons. Some academic libraries have begun to do this for distance education students, but most librarians remain hesitant because they want to be certain that patrons get items and are aware of their responsibility to return them promptly. Now that delivery services can trace packages, however, mailed loans might become more common, if not standard practice.

Public libraries should take note that as essential as interlibrary loan may be, changes in patrons' demands will result in changes in interlibrary loan work. In fact, the role of interlibrary loan departments is evolving so much that in time they may even merge with other library services, such as acquisitions, circulation, access services, reference, preservation, or bibliographic instruction. For instance, if digitization becomes the norm, then interlibrary loan departments may become responsible for scanning material as it is requested. This, in turn, might give them the expertise to digitize unique local holdings, which would involve them in preservation, as well as further aspects of copyright, as they would continue to advocate for fair use privileges for patrons. Alternatively, if document delivery of local holdings for patrons becomes more popular and more material in general is digitized, then interlibrary departments may become on-demand publishing centers for local patrons.

Since it is often easier, quicker, and more cost-effective for libraries to purchase books online once they are requested, rather than to borrow them through interlibrary loan or to buy them ahead of time, interlibrary loan librarians can also participate in collection development and acquisitions decisions. Interlibrary loan specialists are also in a good position to participate actively in reference and information literacy efforts. Interlibrary loan staff members can also help patrons find appropriate alternative resources, such as information that is freely available online or from library databases, so that they do not need to order as much through interlibrary loan. Finally, library resource sharing can also become a circulation function if libraries form consortia arrangements whereby patrons request items through shared circulation systems instead of through traditional interlibrary loan arrangements. Such systems are accessible through online library catalogs and are often less expensive and faster than traditional interlibrary loan conveniences that benefit for both patrons and librarians.

Factors Influencing Resource Sharing

The effectiveness of library services depends on the ability of librarians to provide quick delivery of documents requested by users either from physical stock or through network.

(i) Financial stringencies or lack of institutional funding makes libraries to look at alternative ways of improving and extending resources.
(ii) How to make the existing library resources readily accessible to the members other interested users.
(iii) Skyrocketing journal subscription rates.
(iv) Publisher’s restrictions on electronic dissemination.

Need for Resource Sharing

The need for resource sharing stems from:

(i) The explosive growth of all forms of literature.
(ii) The increasing reliance or demands on information.
(iii) The inflation in the cost of material.
(iv) The increasing cost of information.
(v) Reduced or stagnated budget provisions.
(vi) The impossible to be self-sufficient to meet increasing demands of its users from own collection and it is not desirable to develop huge collections anticipating future demands.

Potentials of Resource Sharing

The need for resource sharing in libraries cannot be overemphasized. The benefits accruing from it include:

(i) *Provision of access to different libraries resources.* Through this, researchers have opportunity to see materials written by experts in their fields and where they can be found. Library patrons can apply for these materials through their librarians.
Where the libraries are near, they can avail themselves of the resources through direct consultation and personal contact.
(ii) *Resource sharing affords librarians the opportunity to exchange services with other libraries in terms of manpower and programs.* Rosemberg(1993) opines that if libraries share work to be done, collections, equipment, manpower and experience, then each library will be richer.
(iii) *When libraries have challenge with specific users' requests, resource sharing helps them to identify libraries that have such materials.* The librarian can then make arrangements on how to obtain these resources for the users. This indirectly saves the time, energy and money that the user would have spent in going to such libraries to source for the materials by them.
(iv) *While libraries share materials, the sharing of experiences and ideas is important.* Librarians are faced with challenges in the daily execution of their work and no librarian can boast of having all the wealth of experience needed to face present and future demands in the library. It behooves libraries therefore to share work, expenses and also benefits. Each library gains from the money and efforts accruing from active participation. While exchanging materials, libraries with fewer resources have the privilege of enjoying the resources of bigger ones. In addition, it provides wider platform for mutual benefit, irrespective of institutional size and capacity.

Libraries that share resources stand a better chance to provide robust materials for their readers. This stems from the fact that materials in different formats arc pulled together so that each participating library accesses them. Rahman cited in Ikpaahindi (2006)

Summarizes the need for resource sharing thus:

(i) To promote free flow of information resources
(ii) To ensure better aces to information resources
(iii) To ensure maximization of information resources
(iv) To save resources· and avoid duplication· of efforts
(v) To ensure faster provision of information and literature support to users.
(vi) To facilitate reciprocal exchange of local publications

Digital Age as a Facilitator for Resource Sharing

The advent of information and communication technology, which characterizes the digital age, has brought a turnaround in resource sharing. Digitization of resources is designed to support the creation and preservation of digital contents. Oladapo (2006) observes that in digital sharing of resources, the use of computers and telecommunications facilitate the exchange of information resources. This means that the emergence of computers through the internet and online services has brought an improvement in the sharing of resources. Information and communication technology has brought to bear new dimensions in the methods of generating, processing, storing and disseminating of information. Digitization brings the information to the user whether in the office or at home. Once the user has a computer connected to the internet, he does not need to visit a library building to access resources. One way of doing this is by placing digital resources on a network so that it becomes available to all participating libraries. It also encourages updating of information on regular basis.

Oketunji (2000) defines information and communication technology in the library parlance as the application of computers and other technologies to the acquisition, organization, storage, retrieval and dissemination of information. The different access points provided to users informs them of the avalanche of literature existing in their fields.

Mosuro cited in llo (2008) observes that by providing different access points for users to locate required information, the world has become a global village and everyone linked to an electronic neighbor.

With ICT, the resources of the libraries participating in co-operation can be accessed online. This affords users ample opportunity to have a vast sea of information without necessarily investing on energy and time. The generation of information and the distribution of the same is facilitated by ICT. Nwalo (2008) noted that ICT encourages communication and exchange of information among co-operating libraries and information centre. Digitization removes geographical and time constraints associated with traditional access to materials. Since materials are not in their physical format, there is no checking out, stealing or wrong shelving of items.

Digital resource sharing is an improvement on manual resource sharing. To a great extent, it has removed rigors and inefficiencies, which characterized manual sharing. The internet exposes users to resources of world leading universities and facilitates an un unparalleled degree of collaboration, resource sharing and information access. Information sources are located in different libraries all over the world. Such information sources have been packaged in digital formats. The libraries can therefore share online databases, electronic journals, online reference tools, web resources, electronic books etc.

Eardly cited in Ibrahim (2008) noted that the outcome of ICT in libraries include improved quality of information in terms of accuracy, level of details, timeliness and increasing efficiency through the sharing of common database either in the same library or externally.

Ogunsola (2004) noted that technology removes the barriers between school and home. Many learners have used audio visual devices to transmit educational materials over long distances. Information regarding the in-house activities carried out in the library such as acquisitions,

cataloguing, classification, journal and newspaper indexing and loan services can also be stored in digital form.

Information on these activities is stored in the system to be consulted as the need arises. This, no doubt, helps libraries organize their resources during sharing. The use of computers and internet connectivity has made it possible the uploading of bibliographic records on the online public access catalogue (OPAC) to the internet for global access.

Digitization enhances preservation of rare publications, dissertations, at1ifacts etc. Physical handling of items during exchange is avoided thus ensuring preservation of such materials. Digital resource sharing helps participating libraries to eliminate duplication. Through interconnectivity, it is possible to see the holdings of each participating library at a glance. It therefore provides a clue on what is available and therefore helps participants to concentrate on the acquisition of very relevant ones, thus freeing scarce financial resources for alternative uses.

Conditions for Effective Digital Resource Sharing

Practical and effective resource sharing devoid of lip service requires certain prerequisite conditions to thrive and for sustenance.

These include;

(i) *Funding*: the acquisition and maintenance of the relevant equipment required for digital resource sharing all depends on the availability of fund. Fund is also needed to connect to the internet, subscribe to the various online databases and obtain software licenses. Mole (2006) observes that most libraries do not have enough funds to install and provide on-line services for their clientele.

(ii) *Computers:* The need for computers in the sharing of resources stems from its ability to receive and store large volumes of information. Internet accessibility is made possible through the use of computers. The computer is employed in the processing of data needed for exchange. It is used to access the OP AC and also share online classification. Nkiko andIlo (2006) posit that when computers are networked and integrated, they play vital role in the performance of routine activities. Such activities include acquisitions, cataloguing and classification, and indexing of materials. Some libraries exchange the performance of in-house activities through networked computers. Despite the fact that computers and allied technology have been used to enhance sharing, many libraries have not embraced it.

(iii) *Internet Availability:* Ikpaahindi (2006) observed that that internet as a technological innovation is used to disseminate all kinds of information. The quest of the academia to explore different fields of study through research is satisfied by the vast sea of resources found on the internet. The online public access catalogue (OPAC) of libraries is also posted on the internet for participating libraries to access their resources. Oladapo (2006) maintains that internet connectivity is critical in any library resource sharing activity. Information on online cataloguing, classification and indexing practices are shared using the internet. However, poor state of the inten1et poses a challenge to the attainment of global connectivity.

The few available internet facilities are concentrated on urban areas. The problems associated with the internet in Nigeria range from poor telecommunication infrastructure

to lack of search skills needed to navigate through the internet so as to harness the avalanche of available literature.

(iv) *Standard and up-to-date union catalogue*: Catalogues shows a record of resources on cards or machine-readable formats. It reflects holdings of libraries sharing resources. It gives users opportunity to search the collections of other libraries. Union catalogues facilitate sharing of catalogue data and library resources through interlibrary loan. The goals include among others the provision of links to document suppliers and electronic journals and the maintenance of accepted standards. It also helps libraries to avoid duplication of resources since they can easily see what is available in each cooperating library. In Nigeria, many libraries do not send their holdings for inclusion in the national union catalogue.

(v) *Proper maintenance skills:* Component parts of computers easily break down as a result of incessant power failure and constant usage in the processing of data.
Sustainable digital resource sharing needs skilled men who will carry out necessary maintenance operations.
Nigeria is characterized by poor maintenance culture. There is also scarcity of maintenance personnel and spare parts for various items of ICT equipment in use. This results in the malfunctioning and breakdown of electronic gadgets necessary for effective digital resource sharing.

(vi) *Computer literacy:* Many academic librarians graduated from library schools without acquiring computer and ICT skills. This makes it difficult for them to embrace technological innovations. However, opportunities abound for trainings nowadays but many have not taken advantage of these for reasons ranging from lack of fund to their inability to accept change. Nok(2006) observes that many librarians are conservative and traditional and suffer computer phobia. Lack of ICT skills places a serious restriction on the progress of sharing of resources.

(vii) *Constant power supply:* It is imperative that power must be available before ICT facilities can function effectively. Effective use of the Internet and proper networking between one library and another are brought to reality through efficient power supply. Digitizing and uploading the OPAC to the internet and accessing the holdings of other libraries which are vital aspects of sharing can only be achieved with the availability of electricity.
Constant power outage, which characterizes power supply in Nigeria, is detrimental to digital systems. Regular supply of power facilitates the use of computer and internet facilities. Unfortunately, most libraries in Nigeria do not have standard generators to ensure steady supply of power in times of outage. This challenge has impacted negatively on resource sharing efforts in Nigeria.

(viii) *Personnel and equipment for completion of projects:* Some academic libraries that started automation in their libraries abandoned the project due to lack of personnel and equipment for effective execution of the projects. Proper automation is necessary if electronic resources must be adequately shared.

Conclusion

Will Google, or any for-profit company provide the same library services, in the same spirit, as non-profit libraries now do. Since no one has a monopoly on knowledge, and too much centralized control is dangerous, the idea of any one company having a monopoly on information is a suspect and potentially dangerous one. One clear risk of letting market forces determine information access is the potential for copyright and antitrust litigation that might curtail the efforts of Google or any of its current or future competitors. Google may go out of business someday, or its leaders or managers may decide to drop their book project if it does not prove cost-effective. The competitive nature of business also supports corporate secrecy, which is inimical to the free flow and use of information. For instance, Google may succeed and agree to pay copyright fees for its digital archive, which might leave competitors unable to compete, innovate, and improve online access to information (Toobin, 2007). There is also the possibility that companies will be pressured to permit or support censorship, as has happened in China. Finally, businesses that pursue short-term profits may not focus adequately on long-term preservation issues. It is precisely for these reasons that public libraries have long been entrusted to provide access to and preservation of information and must continue to advocate for the information needs of society at large, both now and in the future.

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UTILIZATION OF ELECTRONIC INFORMATION RESOURCES AND SERVICES BY USERS OF AHMADU BELLO UNIVERSITY ZARIA, MTN NET LIBRARIES

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Abstract
This study investigates the utilization of electronic information resources and services by users of MTN Net libraries in Ahmadu Bello University *(ABU),* Zaria*. Two research questions were formulated and answered. Survey research design was adopted for this study. A total number of 273 registered library users from ABUMTN Net library were drawn as sample size. Questionnaire was used to collect the data for the study. The data collected were presented and analyzed using frequency distribution tables and percentages. The findings revealed that Sabinet online reference database, national academic press database, virtual libraries online, oxford journal online, free library online, google search engine, ebscohost database, Jstor and e-book libraries were discovered to be the electronic information resources with the highest frequency of over 55% . However WWW services, database services, wiki services and online encyclopedia services were the common electronic information services used very often by the library users in the studied area with over 50% response scores respectively. The study recommends that there is need for library to conducts user orientation and training to students regularly on effective use of electronic information resources. The library management should employ more strategies as a way of promoting their library services such as e-mail alert messages, instant text messages and selective dissemination of information SDI.*

Keywords: Utilization, Electronic, Information Resource, Services, User.

Introduction
The significant developments in the field of information and communication technology (ICT) have created revolutionary changes in all fields of knowledge. Libraries being the reservoirs of knowledge are no exception to this development. The society and environment around the libraries are changing and getting altered. As a result of information explosion users are getting access to vast amount of information. In this information explosion era, libraries play a very vital role in preserving and serving the information requirements of the users.

Electronic information resources are diminishing the central role of traditional libraries. Librarians need to accept the responsibilities as information specialties the new paradigm. Due to information explosion, the traditional library services such as reference services and selective, dissemination of information need to be supplemented by selective elimination of information and the evaluation of information to separate quality information from junk. This change has brought libraries and librarians to the threshold of a new era. Electronic information resources in libraries are considered essential part of modern society. This is because they play a very important role in education. The provision of electronic information resources and services in libraries is important to any educational program that intends to achieve objectives that is in line with the present day global best practices. Electronic information resources (EIR) are now recognized as being of greatest importance to even small academic libraries.

The present supply of electronic information resources is made up of a range of products that may exist in different forms such as CD-ROMs, and resources available on the Internet such as online databases, web pages etc. and they provide libraries with vast resources for their user populations (Gakibayo, 2013. Owolabi, et al 2016).

Problem Statement

There is a growing body of scholarly publications on the Internet which many researchers, lecturers and students are taking advantage to enhance their teaching, learning and research activities. MTN net libraries are designed to provide access to online information resources in institutions of higher learning in Nigeria. The libraries provides access to scholarly materials, database of journal, articles, abstracts and citations, electronic journals, publishing tools and reference database, all wrapped up in a total library package and presented in a word class digital infrastructure to support, teaching, learning and research of the University community. However despite all this effort made by the MTN foundation, university and library management, it was observed by the researcher that some of the electronic information resources are underutilized and the level of their usage were very low. This is evident in the library statistics register records. It is against this background that the researcher tends to investigate the extent of utilization of electronic information resources and services by the users of ABU MTN net library

Objectives of the Study

The objective of the study is:

(i) To identify the extent to which users of ABU MTN Net library utilized the available electronic information resources.

(ii) To identify the extent to which users of ABU MTN Net library utilize the available electronic services.

Literature Review

The advent of electronic information resources has been a blessing to libraries and information centers. The significant changes associated with electronic information resources are shift towards end user searching, leading to big increases in the total number of searches carried out. Owolabi *et al.*,(2016) reported the diffusion and achievements in the utilization of electronic resources and services in libraries. They stated that it has enabled libraries which could not have access to information online, to search in- house. The massive storage capacities in CD-ROMS are an example of electronic information resources that have enabled libraries to access instantly, easily and conveniently, a substantial amount of relatively current and retrospective information. It also saves space as it can hold more content. Libraries have also reported an increase in the use of journal collections. Aboluwarin (2001) reported an increase in library use when electronic information resources was introduced and has made staff more knowledgeable about a variety of operating systems, hardware configurations, software packages and interface designs. Also, Kiondo *et al.*,(2004) reported that currently libraries in institutions of higher learning have realized the potentials of electronic information resources in higher learning and teaching, hence more institutions are embracing it to enhance the quality of education. This is due to the fact that library automation is making profound changes to the teaching and learning environment, as the librarians make available to the user community a wide range of academic and scholarly information.

According to Schutte (2004), utilization of electronic information resources and services has led to the shift from an emphasis of the book and journal collection to an emphasis on information services or from ownership to access. He further argues that the shift has been necessitated by new trends in the provision of higher education and developments in electronic information storage and their accessibility over computer networks. The developmental trends which impact on the provision of information services include current trends in published knowledge whereby more information is made available in electronic format. Dutton (1990) suggests, the skill required to maximize the potentials of electronic information resources are much greater than those required to search printed sources. These skills includes a knowledge of the structure of the database and the kind of information which may be implanted into the computer by the searcher as well as an understanding of the ways in which the institutions are linked with one another. To this end, Brophy (1993) states that users do not often appreciate the skills required to search these sources, stating that they are deceptively easy to use.

Whitmire (2001) observed that the use of electronic information resources is also influenced by students' use of the library. The more a student uses the library the more familiar he becomes with its resources including its electronic information resources. In a study conducted by Luambano *et al.*, (2004), it was found that the users of academic libraries are increasingly utilizing electronic information resources as more access points are made available. The findings indicated that at least 86.3% of users were using electronic information resources and services to browse the World Wide Web (WWW) and to access various online resources, though most of them depend heavily on search engines.

Electronic Information Services

Electronic information services (EIS) on the other hand covers a wide range of information systems like digital libraries, e-journal platforms, portals or e-prints, which discover and integrate information resources and support scientific information seeking, retrieval and use. Advances in technology and transformations in the information landscape have altered the way users interact with such information systems.

The transition from print to electronic medium according to Tsakonas and Papatheodorou (2006), apart from resulting in a growth of electronic information has provided users with new tools and applications for information seeking and retrieval that take their idiosyncrasy into account, rather than obliging them to adapt their own characteristics. Thus, the users' literacy is increased while the interaction complexity is extended. The duo further lamented that two main concepts emerge in user-centered evaluation of EIS, namely usefulness and usability. These two concepts attempt to analyze and evaluate the way a user interacts with an information system with reference to two different but related aspects. The first focuses on the interaction between user and content, both as semantic entity and object, while the second concentrates on the interaction between user and system features. The latter point to use of electronic information resources and service, the former is directed towards its accessibility. To promote electronic information resources and services use, Weingart and Anderson (2000) observed that libraries spend a substantial percentage of their budgets on acquiring and making them available for users. These resources provide access to information far beyond the limits of the libraries' print collections. To effectively use the electronic resources and services, users must know of their existence. It is the responsibility of libraries that have acquired these resources and offer the services to bring to their customers the awareness of such resources and service (Mullah and Chandrashekera, 2005). Electronic services have boosted the fundamental change

in library services, instead of users coming to the library; the library reaches the user with information. This shift is the outcome of the introduction of current awareness and Selective Dissemination of Information (SDI) services. Electronic information services have helped libraries to strive towards end user empowerment, linking patrons with Information without any intermediary agency.

Tammaro (2006), Mullah and Chandrasekhar (2006) listed electronic information services to include:

(i) Mail based – offering information sharing services;

(ii) Bulletin boards for libraries - providing a description of internet resources and current awareness services;

(iii) OPAC - a database describing documents via bibliographic entries composed of fields, some of which maybe queried. It provides access to Bibliographic records for the entire collection of books, back volumes Videos and films of the library. It can be searched in many ways as shown by accession number, title, author, serial number, subject etc.

(iv) Portals/Gateways- These are subject gateways that are important Components of a library website designed for users to help them discover high quality information on the internet in a quick and effective way. They allow easier access to web-based resources in a defined area. They have web pages that contain lists of links to resources. Mullah and Chandrasekhar (2006) observed that the availability of electronic resources depend on the availability of funds as well as the demand for their use.

Methodology

Survey research method was adopted. The population of this study comprises of registered users of ABU MTN Net library (2137), A total of 106 registered ABU MTN Net Library users were selected as a sample size. This figure represent 5% of the population .Questionnaire was the instrument used for the collection of data in this study. Data collected for this study were analyzed using frequency distribution tables and percentages.

Discussion and Findings

Table 1: Extent of Use of electronic information resources in the MTN Net Libraries studied

Type of electronic information resources	Extent of use of MTN Net Libraries e-resources ABU					
	VO	%	R	%	NO	%
Sabinet online reference database	54	55.1	28	28.6	16	16.3
Ebscohost reference database	17	17.3	12	12.2	69	70.4
Jstor	46	46.9	27	27.6	25	25.5
HINARI	9	9.2	12	12.2	77	78.6
Nation Academic Press Database	71	72.4	23	23.5	5	5.1
Virtual Libraries online	63	64.2	27	27.6	8	8.1
Science Direct Online	53	54.1	12	12.2	33	33.7
Law Journals Online	10	10.2	23	23.5	65	66.3
Oxford Journals Online	62	63.3	12	12.2	24	24.5
E-books online libraries	54	55.1	23	23.5	21	
Linguistics Database Online	12	12.2	15	15.3	71	72.4
Gutenberg Online Library	79	80.6	17	17.3	2	2.0
Free Library Online	65	66.3	24	24.5	10	10.2
Google Search Engines	93	94.9	5	5.1	0	0.0
CD-ROMs	8	8.1	12	12.2	86	87.8
E-Newspapers	12	12.2	76	77.6	10	10.2
e-Magazines	4	4.1	27	27.6	67	68.4
e-Print in Science	17	17.3	15	15.3	66	67.3
Digital Library for Earth system education	26	26.5	26	26.5	46	46.9

Key: VO: Very Often **R**: Rarely **NO**: Not Often

Table 1 shows the responses of the respondents on the extent of use of the electronic information resources in the ABU MTN net library. A cursory look at the table revealed that SABINET online reference database, Nation Academic Press database, Virtual Libraries Online, Oxford Journal Online, Free Library Online and Google Search Engine were discovered to be the electronic information resources very often used with the highest frequency of over 55% average scores respectively in the ABU MTN net library studied. The high rate of use of the e-resources confirmed the findings of Tenopir (2003) who found that both faculty and students use and like electronic resources and most readily adopt them if the sources are perceived as convenient, relevant, and time saving to their natural work flow.

On the other hand, EBSCOHOST, HINARI, law journals online, linguistics database, CD-ROMs, e-magazine and e-print in science were discovered not to be often used by the library customers in the ABU MTN net library studied. The reason has been that the databases are

mostly specialized in nature and contents. It was also found that a majority of the respondents (over 60%) rarely used e-newspapers in the ABU MTN net library.

Extent of use of electronic information services in the ABU MTN Net Library

In order to determine the extent of use of electronic information services in the ABU MTN Net Library studied, the researcher provided the respondents list of electronic information services using a 5 point likert scale of measurement. However, the 5 points were merged into 3 points for ease of analysis and data presentation as shown in table 2:

Table 2: Extent of Use of electronic information services in the ABU MTN Net Library

Electronic information services	Extent of use of ABU MTN Net Library e-information Services					
	ABU					
	VO	%	R	%	NO	%
e-Mail Services	19	19.4	56	57.1	23	23.5
WWW services	87	88.8	11	11.2	0	0.0
Electronic bulletin board services	0	0.0	0	0.0	98	100.0
Database Services	89	90.2	5	5.1	4	4.1
Registration Services	10	10.2	76	77.6	12	12.2
Printing services	67	68.4	23	23.5	8	8.1
CD-ROMs Services	0	0.0	11	11.2	87	88.8
The WIKI Services	54	55.1	23	23.5	21	21.4
Online Encyclopedia services	69	70.4	16	16.3	13	13.3

Key:VO: Very Often**R**: Rarely**NO**: Not Ofte

The table 2 Portrayed that www services, database services, the WIKI services and online encyclopedia services were the common electronic information services very often used by the library customers in the ABU MTN library studied with over 50% response scores respectively. At the ABU MTN Universities Connect library, printing services was very often used by the customers, However, the use of external storage devices were strongly not allowed in order to secure their systems and networks.

On the other hand, it was revealed that electronic bulletin board services, registration services and CD-ROMs services were not often used in the ABU MTN net library studied with over 80% response scores respectively. This implies that these electronic services were not fully integrated into the types of electronic services enjoyed by the MTN net Libraries customers in Nigeria.

Conclusion

The study concludes that many scholars acknowledged that electronic information resources and services offer users advanced features and novel forms of functionality beyond those possible in printed form. Therefore, electronic information resources have become a major resource in every institutions library in recent years. The growth and diversity of electronic resources, especially e-books, e-journals, has led many to predict the extinction of the printed journal. However, Based on the data analyzed for this study, it was discovered that many electronic information resources and services were made available and accessible for users of

ABU MTN net library to support their academic activities i.e teaching, learning and research. It is therefore hope that ABU MTN net library users will take the advantage of the convenience electronic information resources and services have to offer, but fully immersed in the new technologies.

Recommendation

Based on the findings of this study, the following recommendations were made.

(i) The management of the library should update faculties on the available electronic information resources and organize user orientation and training on regular basis for effective use of electronic information resources.

(ii) The library management should employ more strategies as a way of promoting electronic information services such as E-mail alert messages, instant text messages and selective dissemination of information SDI.

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CHALLENGES OF EMERGING TECHNOLOGIES IN THE LIBRARY: USERS ANGLE

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Abstract
Emerging technologies has brought a phenomenal change in the delivering of library services to users and at the same time post challenges for library users of today and the future. This paper elaborates on how technological innovations have led to educational destruction in the society which poses various threats to sound educational system and unhealthy learning. Poor reading habit, cyber theft, cyber bullying, and technology obsolete and dependent among others were discussed as the challenges faced by library users. However, it is recommended that orientation/re-orientation and seminar should be given to library users on how to use the technologies, training of staff should be a continue process so that they will be able to meet up with changes as they arise and library management should also make available new technologies as the need arises. The paper concludes that library management must put all hands on deck to seeking that the challenges brought by emerging technologies are eradicated or reduced to a minimize level.

Keywords: Challenges, Emerging Technologies, Library and Users

Introduction
Academic libraries have been the major access points for information, knowledge and means of educating their users – students, staff, and researchers- towards quality teaching, learning and research. In 21th century, their role in this aspect cannot be realized without the application and use of technology. As Omosor (2014) noted that Information Communication Technology (ICT) has ease the processing of information and also make library and information services delivery efficient. Technologies have greatly enhanced and promote access to library resources and its contents. Online access to information has turned many libraries into "virtual libraries" and the paradigm shift from the concept of library being a physical place where people could visit to access information, to a social cyberspace where users could interact with the each other and the information resources without been physically present in the library.

In era of socio-technology, libraries especially academic libraries are changing the way in which information is stored, accessed, disseminated and used by the library clients/users (Mishra, 2001). Hence, technologies and new innovations are providing library and information centers with powerful new tools to meet their user's information needs beyond their traditional printed

materials. In addition, technology is widely considered as the most important revolution that human kind has experienced since its inception. The invention of Internet, intranet, mobile phones, satellite communication and wireless technologies have linked people and information and have fundamentally changed the way things are being done (Aharoney, 2014). He further opines in his study on mobile technology that "IT has changed the way people carry out their learning and communication activities." And it is seen as an emerging innovation that affects individual and organizations.

The use of technologies has penetrated the educational system and their library and information centers. In learning environment, these devices provide users with the opportunity to access, use, disseminate and generate information. In addition, they facilitate easy and timely access to information on the move. With the advent of the Internet, mobile technologies, mobile applications, ipad, computers and the likes is making library users especially scholars and researchers to reach or have access to rich information content provided in library and information resources available in their libraries. This made Tiemo and Edewor (2011) in Omosor, (2014) to stated that "social media referred to as library 2.0, mobile phone, and internet are increasingly becoming powerful tools for enhancing access to library database and other resources." Lippincott (2010) opined that students, researchers and academics will use some of these technological devices not only for access, but also for digital content creation.

However, in Nigeria, the educational system, library and information centers and the society at large are facing a lot of challenges in this era of information/knowledge revolution where library users are confronted with a lot of negative impact (aspects) of these devices in an ever changing technological environment. That is why; Beres (2017) asserted that there is danger of technology usage especially "in a distracted, smart phone age in which one-quarter of American children doesn't learn to read. This not only endangers them socially and intellectually, but cognitively handicaps them for life". This phenomenon is also observable in the developing country like Nigeria as most of the youths are not vibrant as they are not reading.

With the application of these new technologies and the shift from traditional library access, to digital library services to use of mobile applications by library patrons, the questions that one will ask is whether those librarians, information professionals and other stakeholders are aware of the destructive aspects of these emerging technology and its implications in lifelong education and also in the development of the country? Thus, the explosive growth of ICT and other new technological innovations use in the libraries have had impact on librarians, users, researchers, academics and the likes. It is against this background that this study attempts to explore the destructive aspects of the emerging technologies in academic libraries with particular reference to Nigerian academic libraries and their users.

Overview of Academic libraries

Academic libraries play major roles in the manpower development of any nation since they provide information resources and services that assist in the training of high as well as middle level manpower needed for social, economic and political advancement of a nation. This according to Okiyi (2010), is done through their programmes of teaching, learning, research and community services. The central place of academic library is called into play because it is their duty to provide the necessary information to achieve these goals in the easiest, fastest and most comprehensive way. Academic libraries in Nigeria are therefore, engines of growth and development.

Higher education of learning globally requires information to function effectively. Scholars like Nwalo (2000) and Adetimirin (2007) have adjudged information as a vital tool in any organization. The library has a great role to play in the provision of the right information in the right format to the right users and at the right time. In other to meet up with this mandate, libraries especially academic libraries have adopted technologies into the library services. However, in the era of information overload, library users are confronted with a lot of information at their disposal, and as a result, they are not patronizing the library to access the physical resources available. The challenges to academic library from changes in educational approaches are the various threats posed to sound education system and unhealthy learning in the society (Sharma & Bhardwaj, 2009). Despite the numerous benefits of information technology (IT) to library users, as justified by Manjunatha, Pai and Mattew (2007) that technological advancement have made significant impact on the growth of knowledge and it has unlock the human potentials. It is seen as a factor militating against students/users academic performance and their meaningful contribution to the developmental process of the economy.

Destructive Aspect of the Emerging Technology in Library: Users' Angle

The following are the negative/destructive aspects of technologies to library users:

Poor reading habit: Reading is the primary principle and process of learning which involve the practice of comprehending and acquiring knowledge for personal growth and development. To it (2001) in Omoyele (2016) defines reading as "a process of thinking, recalling and relating concepts under functioning of written words. It is also meant to recognize and examine words or sentence and understand the information within. It is an essential process that aids the conception of thoughts and knowledge in ones chosen field of study or specialization. Ability to read is however at the heart of self-education and lifelong learning; an art capable of transforming life and society (Oriogu, Subair, Oriogu-Ogbuiyi and Ogbuiyi, 2017). Reading is a cognitive process of understanding a written linguistic message and to examine and grasp the meaning of written or printed characters, words or sentences." Therefore, for students in tertiary institutions to perform well in their academic pursuit, reading is the basis to effective learning. Reading habits will enable students to have effective study skills, knowledge of different information resources, and effective retention capacity. Talking about poor reading habit among Nigerian students does not exist on its own, but various factors lead to it among which are the use of technology such as Social media- Facebook, Whatsapp, Twitter, 2go etc. Another major factor militating against students reading habit is the use of mobile phones; rather than reading or using the available facilities in the libraries for learning activities, students spend productive hours on Whatsapp, pinging, watching phonographic movies, taking photographs which are sent to Facebook, Twitter, Instagram among others. This issue have de-generated to the level that even when important information are placed on the walls and notice boards, students don't see it because with they are busy with their mobile phones reading Whatsapp messages, looking for their cute pictures and pinging. Students relies read relevant information on their notice board rather they rely on messages from their friends through chat (Omoyele, 2016).

Cyber Crime: When technology is used in stealing other people's properties it is called crime. Today, network attacks are becoming more serious when they are inflicted upon an organizational operation that store sensitive data on the server of an organization such as

library. The consequences of attacks may completely debilitate important data can be lost hence; privacy can be violated (Kadyan & Vats, 2016). This form of crime is widely being perpetrated by tertiary institution students in Nigeria. The problem has, however, remained pervasive, despite past efforts put in place by the government to curtail it. The current unprecedented and massive involvement of Nigerians, especially, the university students in it, makes it a serious problem that requires urgent redress. According to Aghatise (2006), it is alarming that 80% of cyber crime perpetrators in Nigeria are students in various institutions. Indeed, many undergraduates in Nigerian universities have embraced internet fraud as a way of life; while many of them have become rich, some others have been caught by the law (Tade & Aliyu, 2011). In Nigeria, the varieties of applications offered by the Net such as electronic mailing, 'chat' systems and Internet messaging (IM) often serve as veritable grounds for carrying out fraudulent activities by the youth, where both gender are functionally involved in it.

Cyber bullying: Is the act of sending mean and sometimes threatening emails or text messages to one another; spreading gossip, secrets or rumors about another person that will damage that person's reputation; breaking into an email account and sending hurtful materials to others under an assumed identity; creating blogs or websites that have stories, cartoons, pictures or jokes ridiculing others; creating polling websites where visitors are asked to rate individuals' attributes in a negative manner. It also involve but not limited to taking an embarrassing photo of someone with a digital camera and emailing that photo to others; engaging someone in instant messaging, tricking them into revealing personal information and then forwarding that information to others; using someone else's password in order to change their profile to reflect sexual, racist and other content that may offend others; Posting false or hurtful messages on online bulletin boards or in chat rooms as accessed online https://www.stopbullying.gov/cyberbullying/what-is-it/index.html 2017. Problems arise when the technology that is supposed to bring people together is used instead to abuse others, pushing peers out of their social network into a world that is filled with loneliness, embarrassment, fear or shame. Not only individuals but society as a whole is likely to undergo these negative effects of too rapid change. The three basic attitudes are easily recognized in current patterns of social behavior. Aggression directed at no one in particular seems to underlie phenomena like vandalism and hooliganism. Cell phones and computers are not to blame for cyber bullying as social media sites can be used for positive activities, like connecting, collaborating, helping students/ users with school activities, and for entertainment. But instead these tools are used to hurt other people. Whether done in person or through technology, the effects of bullying are similar. Library users who are cyber bullied are more likely to: Use alcohol and drugs; skip school; be unwilling to attend school; receive poor grades; Have lower self-esteem and have more health problems.

Information overload: This destructive impact of technology in the library occur when our ability to process information has passed its limit and further attempts to process information or make accurate decisions from the surplus of information leads to information overload (Ngwyen, 2011). One of the most significant impacts of information overload is that one will no longer be able to learn or improve one's performance because one can no longer processing any relevant feedback. Without knowing if one is doing better or worse, this prevents the sort of deliberate practice required to become better at anything (Kromer, 2011).

Implications/Effects for the Negative Impact of Technology in the Library

The academic library is not a separate entity on its own but part of the parent organization that established it. Therefore, whatever happens to the users' community has a direct proportion on the library. That is, the effect of technology can be felt on the attitude of students toward their academic performance, personality behaviour and their contributions toward national development. One of the major impact of these technologies on the user as earlier noted is their poor reading habit which has affected the level of reasoning because reading does in fact make us more intelligent, as its not only help with fluid intelligence, but with reading comprehension and emotional intelligence as well. One makes smarter decisions about oneself and those around us (Beres, 2017).

In addition, youths of today are not engaging in critical thinking and critical reflection because they are not engaging in critical reading again; what they are doing today is copying and pasting other peoples' work which has affected the way Nigerians are being rated in the world. As a result of their inability to engage in critical reflection, most of these people are no longer vibrate, there are not articulating and are not representing themselves; rather, they money conscious the national interest is no longer there.

In another instances, there are cases of students committing suicide after been bullied by someone on the Internet, some might not be able to concentrate on their study as a result of bullying. Some have been 'killed internally' that is with these technologies have made some to died a 'natural death' that it will take the grace of God for them to function normally again in life. That is why PREV Net (2017) noted that "kids who are cyberbullied feel an intense sense of isolation, fear, loneliness and despair. Their desperation can sometimes lead to acts of self-harm or tragically, even suicide".

Nevertheless, another effect is the problem of neurosis in present society is anxiety. This is seen by the record use of anxiolytic drugs (e.g. benzodiazepines) that suppress anxiety symptoms such as sleeplessness, worrying, irritability, tension and digestive upsets. Anxiety also shows in the many irrational fears and scares, where far-away threats trigger disproportionate reactions (Heyligten, 1999).

Conclusion

Despite the negative aspects of these technologies, there are also some benefits of these devices to users. However, with adequate monitoring and continues sensitization it is hoped that the established negative aspects would not overshadow the positive aspects.

Recommendations

From the above established points the following recommendations are proposed:

(i) Constant monitoring of students activities especially when they are on the institution's network.
(ii) Training and retraining of librarians on network security.
(iii) Frequent sensitization of users on the negative effects of these technologies on their career.
(iv) Librarians should collaborate in the teaching and practice of critical reading and critical thinking which will automatically allow the students to engage in critical reflection which is the ultimate of learning.

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EFFECT OF SOCIAL MEDIA ON THE SERVICE DELIVERY AND PRODUCTIVITY OF FOUR SELECTED PHARMACEUTICAL COMPANIES IN MINNA AND ILORIN, NIGERIA

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Abstract
The study investigated the effect of innovative service delivery, social media and information dissemination on the productivity of four selected pharmaceutical companies in Minna and Ilorin, Nigeria. Part of the objectives of the study was to investigate the level of social media awareness on service delivery and productivity of pharmaceutical companies in Minna and Ilorin and the extent of social media proficiency on the pharmacists innovative services delivery on drug production in pharmaceutical companies in Minna and Ilorin, Nigeria. Survey research design was adopted for the study and purposive (judgmental) random sampling technique was used to select two (2) pharmaceutical companies in Minna and Ilorin respectively. A total number of eighteen (18) pharmacists were selected from the sampled companies. Descriptive and inferential statistics were used to analyse the data collected. Part of the findings revealed that there is high awareness on the use of social media for service delivery in pharmaceutical companies and that there is high proficiency on the use of social media for innovative service delivery by pharmaceutical companies. The study concluded that there is strong correlation between the use of social media, information services delivery and the productivity of pharmacists in the pharmaceutical companies selected for the study. The study recommended amongst others that pharmacists should deploy all forms of social medial that are up to date in their service delivery with the hope of boosting their productivity in this information driven age.

Keywords: pharmaceutical companies, productivity, service delivery, social media; Minna and Ilorin, Nigeria.

Introduction

Information is a vital and indispensable resources that is used to boost the productivity of all organisations including pharmaceutical companies. The need for the deployment of appropriate technology in form of social media for enhanced service delivery could not be over emphasized. If the services of the pharmaceutical companies would receive a boost, there is need for innovation and creativity in this information driven age.

Equally, information is one of the vital tools for effective and efficient production and distribution of goods and services in any sector of the economy including pharmaceutical companies. In this information age, social media has gained enough ground as a means of disseminating information as well as delivery service. Similarly, social media is considered as the greatest and best innovative means of information dissemination and delivering service. Social media is a collection of online technologies that allow users to share information, insights, experiences and opinions with one another; the sharing can be in the form of text, audio, video or multimedia (Safko & Brake, 2009). However, social media is the combination of two word; social and media which simply means the process of interaction between two or more people, group and society with the aid of Internet and computer or electronic devices like multimedia

handsets, tablets and so on. The Internet and the World Wide Web are a remarkable innovation that allows access to an almost infinite storage of information (Wangu, 2014).

Pharmaceutical company is one of the major sectors that deal with the health of human life and life seizes to exist without the existence of living souls especially human beings. In pharmaceutical companies, research would help in producing new and effective drugs according to the needs of the communities or users/patients. The medicine and other related treatment equipments produced by pharmaceutical companies in Minna and Ilorin to suit the needs of the patients could not be accurate without adequate information. Information need could not be accessed without the use of social media to acquire authentic, accurate, relevant and current information as well as disseminate it.

Statement of the Problem

Information is the bedrock for successful production of any company including pharmaceutical companies. Use of social media as a mean of acquiring new knowledge and ideas and disseminating information by the pharmacists is necessary for effective production of medicines and other related treatment tools in pharmaceutical companies. However, it is obvious that some pharmaceutical companies produce sub-standard medicines such as panadol, ibuprofen, anti-malarial medicines, ampiclox to mention but a few; and when these drugs are taken to cure an illness they occasionally fail the patients. One wonders what could be the reasons behind this horrible experience, especially as the pharmaceutical companies deal with health of humans and other living beings. Similarly, it is expected that the pharmaceutical companies should engage professional pharmacists whose versatility in the use of social media applications and production of medicines could help to meet the various health challenges of humans.

The pharmaceutical companies are expected to provide original and effective drugs and other treatment materials in actulisation of the mission and vision of the national and global pharmaceutical body. This expectation is yet to be actualised especially as earlier stated that some sub-standard drugs exist in Nigerian hospitals. This could be due to lack of use of social media applications in acquiring up-to-date, innovative information bearing resources in the production of drugs in Minna and Ilorin.

The study therefore, investigates the effect of social media on the service delivery and productivity of pharmaceutical companies in Minna and Ilorin, Nigeria.

Objectives of the Study

The main objective of the study is to investigate the effect of social media on the service delivery and productivity of pharmaceutical companies in Minna and Ilorin, Nigeria. The specific objectives are to:

(i) Investigate the level of social media awareness on productivity of the pharmaceutical companies in Minna and Ilorin, Nigeria.

(ii) ascertain the extent of social media proficiency on the pharmacists service delivery on drug production in pharmaceutical companies in Minna and Ilorin Nigeria.

Research questions

To archive the forgoing objectives, the following research questions were raised:

(ii) What is the level of social media awareness on productivity of the pharmaceutical companies in Minna and Ilorin?

(ii) What is the extent of proficiency on the use of social media for service delivery on pharmaceutical companies in Minna and Ilorin?

Hypotheses

The following null hypotheses were tested in the study at 0.05 level of significance:

H1: There is no awareness in the observed frequencies of the level of awareness of social media for productivity in pharmaceutical companies.

H2: There is no proficiency in the observed frequencies of the extent of proficiency on the use of social media for service delivery in pharmaceutical companies.

Scope of the Study

The study covered all the four (4) pharmaceutical companies in Minna and Ilorin, Nigeria and the entire pharmacists found in the companies. The study also determine the extent to which social media and information dissemination affect innovative service delivery and productivity of the pharmaceutical companies in Minna and Ilorin, Nigeria.

Research Methodology

Survey research method was adopted for this study and purposive (judgemental) random sampling technique was used to select two (2) pharmaceutical companies in Minna and Ilorin respectively. The researchers found this research survey as a means to retrieve, describe and interpret the data on the effect of social media on the service delivery and productivity of pharmaceutical companies in Minna and Ilorin. According to Ponto (2015) survey research method could be used by quantitative research strategies (use of questionnaires with numerical rated items).

The total population of this study is eighteen (18) pharmacists from four pharmaceutical companies selected in Minna and Ilorin, Nigeria as shown in Table 1.

Table 1: Population of the study

S/N	Name of pharmaceutical companies	No of pharmacists
1	Dana Pharmaceutical Ltd, Minna	7
2	Bioraj Pharmaceutical Ltd, Ilorin	3
3	Tuyil pharmaceutical industry Ltd, Ilorin	4
4	Leyjay Pharmaceutical Ltd, Minna	4
	Total	**18**

Source: Field survey, 2018.

Table 1 shows the four pharmaceutical companies that were studied in the two towns and the population of pharmacists in each pharmaceutical companies.

A closed ended questionnaire was used for the study. The research instrument designed for the study was a self-designed questionnaire. Questionnaire was the most appropriate instrument that was used for the study due to the fact that it is cost effective and the administration and collection of data could be achieved within a stipulated time (Ibrahim, 2013).

This study used descriptive statistics to analyse part A, which is the demographic variables of respondents; inferential statistics of Chi square test for goodness of fit was used in part B which consist of two research hypotheses. Chi square test was used to investigate the effect of the difference between the observed frequencies and that expected frequencies of social media on the service delivery and productivity of pharmaceutical companies. Test Statistics is defined as:

$$\chi^2 = \sum_{i=1}^{k} \frac{(O_i - E_i)^2}{E_i}$$

where O_i (i = 1, 2, …, k) is the set of observed frequencies on k classes and E_i (i = 1, 2, …, k) is the corresponding set of expected hypothetical frequencies. The Statistic χ^2 follows χ^2 distribution with (k-1) degrees of freedom. Level of significance (α) and critical region $\chi^2 > \chi^2_{\alpha,(k-1)}$, such that $P\{\chi^2 > \chi^2_{\alpha,(k-1)}\} = \alpha$.

If $\chi^2 \leq \chi^2_{\alpha,(k-1)}$, we conclude that the data do not provide us any evident against the null hypothesis and hence it may be accepted H_0 at α % level of significance. Otherwise reject H_0 or accept H_1.

Level of significance α = 0.05 and Critical value: $\chi^2_{0.05,\,3}$ = 7.815 are used.

Results and Discussion

Descriptive statistics of demographic variables

Table 2: Summary of Descriptive Statistics

Gender	Age	Academic Qualification	Marital Status	Department	Rank
Males= 12	Min = 22	BSc = 9	Married=11	Blister = 2	Assist P = 7
Females=6	Median = 30.5	MSc = 6	Single = 7	Compression=2	Manager P=3
	Mean = 32.6	PhD = 3		Inspection = 3	Pharmacist=8
	Max = 53			Parking = 4	
				Tablets = 4	

The demographic variables of the respondents used for the study are described in Table 2. It is an evident from Table 2 that there are twelve (12) males against six (6) females. Nine (9) of the respondents have First Degree and are within the age range of 21-30 years (Min), while six (6) with Masters Degree are within the age range of 31-40 and three (3) with Ph.D are within the age range of 41 and above. The Table equally shows that eleven (11) of the respondents are married, while seven (7) are single with varied ranks and departments.

Research question 1: What is the level of awareness of social media on the effect of productivity in pharmaceutical companies studied?

Research hypothsis 1

H_0: There is no significant difference between the level of awareness of social media and productivity in pharmaceutical companies.

H_1: There is significant difference between the level of awareness of social media and productivity in pharmaceutical companies.

Table 3: Chi square test for level of awareness of social media on productivity in four pharmaceutical companies

Response Type	Coded Ratio	Frequency		$(O_i - E_i)^2$	$\frac{(O_i - E_i)^2}{E_i}$
		Observe(O_i)	Expected(E_i)		
Highly Aware	4	196	180	256	1.42
Aware	3	130	135	25	0.19
Low Aware	2	89	90	1.000	0.01
Not Aware	1	35	45	100	2.22
TOTAL	**10**	**450**	**450**		**3.84**

Conclusion: Sinceχ^2 =3.84is less than $\chi^2_{0.05,\ 3}$ = 7.815, the study concluded that the data do not provided us with enough evidence against the null hypothesis H_0. Hence, H_0 is accepted at 5% level of significance and concluded that there is no significant difference between the level of awareness of social media and productivity in pharmaceutical companies. That is, there is high level of awareness of social media which automatically has good effect on productivity in pharmaceutical companies studied.

Research question 2: What is the extent of proficiency on the use of social media for service delivery in pharmaceutical companies studied?

Research hypothesis 2

H_0: There is no significant difference between proficiency extent of social media and service delivery of drugs in pharmaceutical companies studied.

H_1: There is significant difference between proficiency extent of social media and service delivery of drugs in pharmaceutical companies studied.

Table 4: Chi square test for extent of proficiency on the use of social media for service delivery in four pharmaceutical companies

Response Type	Coded Ratio	Frequency		$(O_i - E_i)^2$	$\frac{(Oi - Ei)2}{Ei}$
		Observe(O_i)	Expected(E_i)		
Highly Profici	4	174	180	36	0.2
Proficient	3	128	135	49	0.36
Low Proficien	2	86	90	16	0.18
Not Proficient	1	62	45	289	6.42
TOTAL	**10**	**450**	**450**		**7.16**

Conclusion: Since χ^2 = 7.16 is greater than $\chi^2_{0.05,\ 3}$ = 7.815, the study concluded that the data do not provide us with strong evidence against the null hypothesis H_0 and therefore, H_0 is accepted at 5% level of significance. That is, there is no significant difference between proficiency extent of social media and service delivery of drugs in pharmaceutical companies

studied. This means that there is proficiency on the use of social media for service delivery in pharmaceutical companies studied.

Conclusion

It is apt to conclude from the study that there is high awareness on the use of social media for service delivery of pharmaceutical companies and that service delivery could be enhanced through the use of social media.

Recommendations

In view of the findings from the study, the following recommendations are made.

(i) Pharmacists should deploy the latest social media technologies that could boost their services delivery and productivity.

(ii) In this information age, pharmacists and pharmaceutical companies should organize workshops, seminars and researches that could improve the knowledge base of the pharmacists with the hope of boosting their service delivery in this information age.

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IMPROVING THE NIGERIA PAYMENT SYSTEM: CHALLENGES AND WAY FORWARD

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Abstract
The paper reviewed the payment systems as implemented in Nigeria. Nigeria economy is cash based and this has led to high level of fraud and fraudulent practises which has eroded the confidence the people has in the system. However, there is need for reduction of the nation's cash based transaction so as to reduce the amount of money supply outside the banking system and the large proportion of the idle cash balances. It was therefore suggested that a safer, faster, secured and effective system like Nigeria Inter-Bank Settlement System (NIBSS) Instant Payments, Real Time Gross Settlement system (RTGS), must be employed in order to prevent fraud and have an enhanced payment system and financial transactions' turnaround time in Nigeria

Keywords: Cash, Fraud, Payment System, Economy.

Introduction
The economic development of every nation lies in the strength and efficiency of its financial system which is a function of an effective banking system. The banking system is a platform through which financial activities are transacted; and this sector ensures that funds are smoothly and efficiently transferred from one unit to another unit (creditor and debtor relationship) in the economy and this form the basis of the payment system.

According to Ojo (2010), the nation's economy is basically cash based economy and Cash transactions continue to be highly and widely used in spite of its inherent danger such as money laundering, fraud, armed robbery attacks, large production of fake currency notes and coins etc. These increase the cost of currency management and leakages.

Also, the nation has very high record of sharp practices and fraudulent schemes and all these make less effective the payment arrangements. These include wrong delivery of clearing instruments as well as presentation of fake or cloned cheques to paying banks.

Therefore the improvement of the nation's payment system is very importantin order to help solve the problems encountered by the predominate use of cash. Markiewicz (2015) due to its relevance on the conduct of monetary policy, soundness of financial firms and the overall functioning of the economy as a whole. The need to improve Nigeria's payment system has become increasingly important because it will improve cost efficiency in terms of operating costs and access to and usage of liquidity; enhance the services of banking, payment and securities, better contained operational, financial and systemic risks in payment infrastructures; create more suitable oversight and regulatory regimes for the national payment system and

improve the efficiency and stability of payment service markets. Payment system can be viewed as an arrangement consisting of institutions, instruments, organizations, operating procedures, and information and communication systems, usually within a nation's financial system, used to initiate and transmit payment from payer to payee and to settle payment that is, transfer of money(Ojo, 1998). A country's payment system owe its success on the degree of trust and confidence the people have in the entire banking and financial system considering the recent negative development as a result of financial fraud and fraudulent practises, it is therefore relevant to take stock of the stages of development and the extent of damage done on the country's payment system and to proffer the measures that can be used to curtail the further damage and as well as proffer new techniques to improve the system Therefore, this paper discusses the prospects of improving the Nigeria payment systems and its benefits to the economy.

Objectives of the Study

The major objectives of this paper are:

(i) To examine the various payment system in Nigeria.
(ii) To provide alternative ways of improving the Nigeria payment system.
(iii) To check whether the improvement made on Nigeria payment system has help solve the problem of fraud

The Overview of Payment System as A Concept

The payment system plays a very crucial role in any economy, being the channel through which financial resources flow from one segment of the economy to the other, it therefore represent the major foundation of the modern market economy. It is also the system used to settle financial transactions through the transfer of monetary value, and it includes the institutions, instruments, people, rules, procedures standards and technologies that make such an exchange possible (Balino & Omotunde 1996).

According to Ojo (2010), payment instruments take many forms, such as cash, cheques, travellers' cheques, money orders, debit and credit cards, wire transfer, automated clearing house transfers, smartcard value card, point-of-sale (POS) and automated teller machines etc. In late 20th century, some of the European and Asian countries (i.e. Italy and Malaysia) embarked on payment system reforms in order to speed up the processing of payments, reduce the risk and uncertainty associated with noncash payments, facilitate adoption of indirect instruments of monetary policy, and foster financial market development. Harmonization of payment system arrangements has been a key technical reform in the progress toward a single monetary policy in the European Monetary Union.

Balino et. al (1996) There are two types of party involved in all payment systems, the issuers and the users. An issuer is an entity that operates the payment service. An issuer holds the items that the payments represent (i.e., cash held in regular bank accounts) whereas the users of the payment service perform two main functions, that of making payments and that of receiving payments, and as such can be described as a payer or a payee respectively. For a payment system to be efficient (Ayodele, 2015) opined that it must perform the following functions.

(i) Fostering a sound financial system and economic growth.
(ii) Development of financial sector in order to serve the needs of the real economy.
(iii) Transformation of banking systems and emerging money markets.

(iv) Development of business transactions both locally and internationally.
(v) Promotion of efficient allocation of financial resources through thereduction in payment risks and transaction costs.
Payment system involves cash and cashless transactions (electronic based payments) and other forms therefore, it is necessary to improve these instruments in order to attain the required development and economic growth

Payment System and Its Instrument

In a developing economy like Nigeria, instruments of Payment take many forms and each has different operating characteristics, rules and settlement mechanisms.(CBN 2015)Instruments such as cash, cheques, debit card, credit cards, wire transfers, automated clearinghouse transfers, point-of-sale transfer (POST) and automated teller machines(ATM) are effectively used in Nigeria. There are a number of desirable qualities of payment instruments, of which the most common is liquidity, which relates especially to general acceptability and marketability, with little or no risk of capital loss.

Improving The Payment System In Nigeria

A safer, more efficient and faster payment system contributes to public confidence and economic growth and how effective the payment activities in a particular country is depend on the arrangements that facilitate fund transfers between the parties involved and it is through these arrangements that constitute a "payment system", which is an important part of the economic and financial development. Its efficient functioning allows transactions to be completed safely and on time, which is key to overall economic well-being.

A recent report from ACI Worldwide, a payment system company that offers products and services designed to facilitate electronic payment used by the financial institutions revealed that 75% of businesses believe their customers want more payment options, and nearly 47% of organizations expect that investing in more and better payment options and capabilities can improve the customer experience. Provision of more payment option other than the usual traditional method of payment can help improve the payment system. Nigeria operates a highly cash based economy as most of the transactions are done predominantly with cash or cash related transactions as shown in the table below.

As a result of the introduction of a new payment instrument in 2012, there is a significant increase in the value of transaction made considering the data given from the year 2009 to 2011; the increment was as a result of the provision of a faster, secured and effective system. In Nigeria, apart from the old methods of payment reviewed earlier, there are some innovation and products introduced by Central Bank of Nigeria through the various banks to help improve the payment system and service to the general public.

One of them is the Nigeria Inter-Bank Settlement System (NIBSS) Instant Payments, a payment scheme that was rebranded of recent enables real-time inter-bank account-to-account instant electronic fund transfers. this facility was put in place to remove the potential bottleneck associated with interbank funds transfer and provide mechanism for clearing and settlement of transactions instantly between banks which eradicate the delay that associated with the use of cheque and further reducing the risk associated with uncertainties in receiving value for payment and difficulty in maintaining efficient and effective treasury operation and timely reconciliation.

The Nigerian payment system has been encouraging and are improving with the introduction of Real Time Gross Settlement system(RTGS), This is a fund transfer system in which transfer of money or securities is done from one bank to another on a 'real time' and on 'gross' basis. Settlement in 'real time' means payment transaction is not subjected to any waiting period.

Fatokun, (2013) observed that the RTGS, enabled by the Society for Worldwide Interbank Financial Telecommunication (SWIFT), had enhanced financial transactions' turnaround time in Nigeria, he also observed that the development has facilitated the smooth and rapid settlement of interbank transfers, and the era of insecurity and defaulting in payment or making payment or defaulting in security has gone with the new RTGS."

He further noted that the introduction of the financial solution had raised the confidence level of participants in the nation's payment system and has help improve all retail payment schemes.

Smith (2013) also observed that in the last five years, Nigeria's payment system had improved significantly with the introduction of the RTGS and that Nigeria had aligned itself with international best practices, and that the SWIFT is widely used in the RTGS system, with its adoption, Nigeria has really come to align itself with international best practices and standards.

All these are prospects that have positive effects of attending to customers' needs faster including quicker methods of providing deposit service, transfer and payments services, use of credit cards of various types, cheques designed for selected creditworthy customers to enable them use the cheques to obtain cash in some parts of the country outside where their account are maintained.

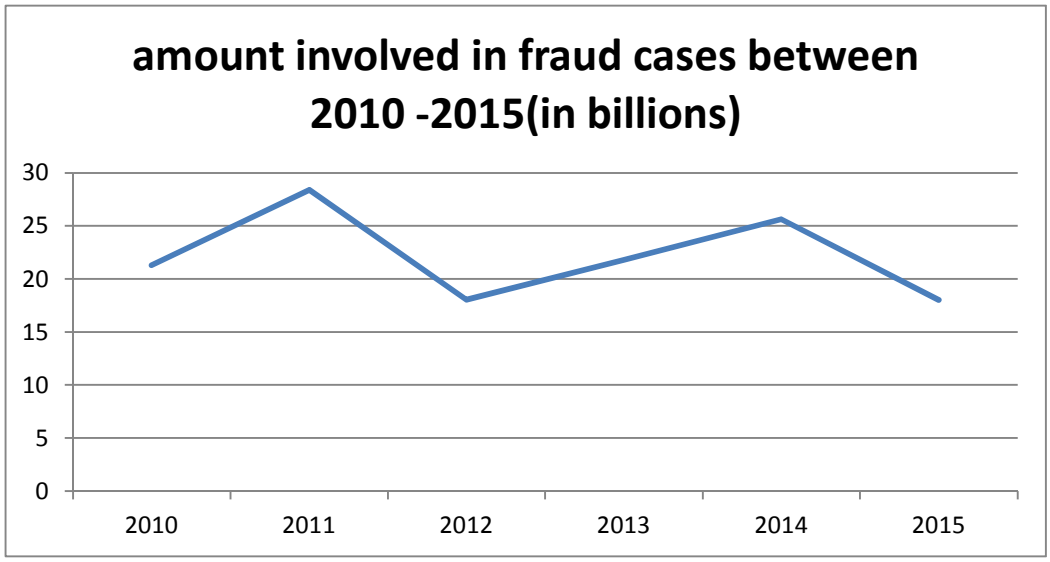
The Nigeria payment system in the last three years has encouragely improved and has really become almost an example to what is done internationally.

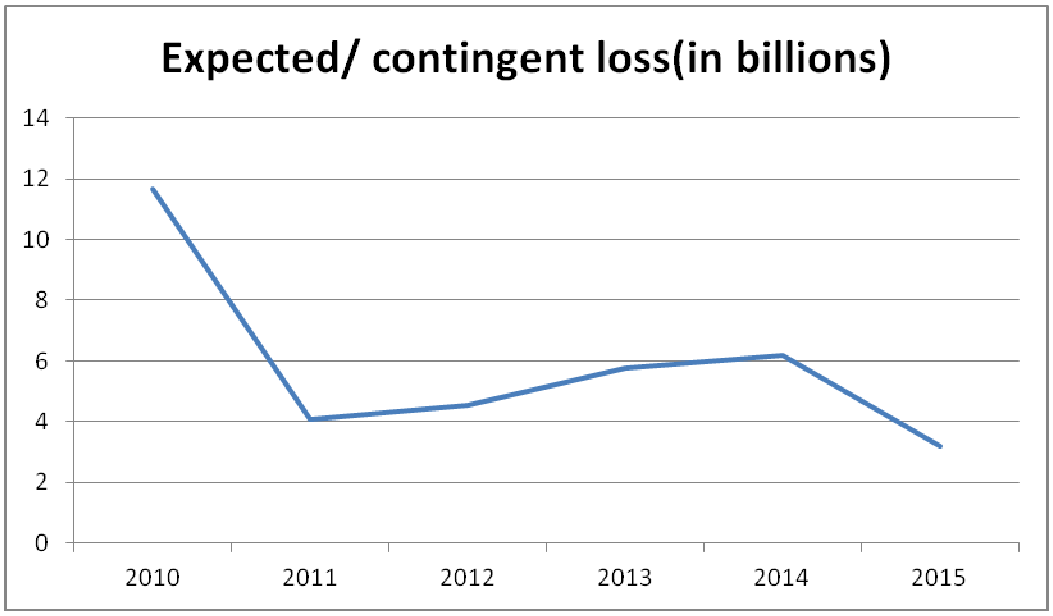
The challenge is how to ensure that there is reduction in the fraud and fraudulent practises and the unbanked community has access to this financial system in order to increase the coverage.

Talking about fraud in Nigeria payment system, there are improvement in the recent time as a result of the improvement made on the system as given in the data below

Years	Fraud Cases	Amount Involved in Fraud Cases (Billion Naira)	Expected/Contingent Loss (Billion Naira)
2010	1,532	₦21.29	₦11.68
2011	2,352	₦28.40	₦ 4.071
2012	3,380	₦18.05	₦4.52
2013	3,756	₦21.79	₦ 5.76
2014	10,612	₦25.608	₦ 6.19
2015	12,279	₦ 18.021	₦3.17

Source: NDIC





The above table reported 12,279 fraud cases in the year 2015 involving the sum of ₦18.021b with expected/contingent loss of about ₦3.17b. The expected/contingent loss had reduced by ₦3.02b from ₦6.19b reported in the year 2014. Notwithstanding the increase in the number of fraud cases from 10,612 in 2014 to 12,279 in 2015, the amount involved in fraud cases reduced from N25.608b in the year 2014 to N18.021 in 2015 as shown in the table. The constant increase in the number of fraud case could be said to be as a result of rising fraud cases through the use of ATM and other cash based methods (2012 NDIC ANNUAL REPORTS),these reductions show that fraud was better curbed, and more effective measures were taken to combat fraudsters in 2015.The table also reported a sustained fall in the expected/contingent loss and this could be said to be as a result of the improvement made on the system by the introduction of faster, secured and effective system.

Conclusion

Nigeria payment system has experienced setbacks as a result of wide use of cash based payment systems and the use of these systems must be discouraged or reduced in other to rebuild the confidence upon which the system should be based by encouraging more faster, secured and effective system such as Nigeria Inter-Bank Settlement System (NIBSS) Instant Payments, Real Time Gross Settlement system (RTGS), and as a result these, less cash will be employed and a large proportion of the idle cash balances being held for cash transactions would be reduced also reducing the amount of money supply outside the banking system.

These modern systems will further reduce the common incidents of returned cheques because of lack of funds, money laundering, fraud and fraudulent practises, long queues in the banking hall, that has eroded the confidence people have in the system., there is also need by the authority to put in place appropriate laws and regulation to guide payment operations in other to protect the citizenry.

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EFFECT OF COOPERATIVE LEARNING STRATEGY, DEMONSTRATION METHOD AND GENDER DISPARITY ON ACHIEVEMENT OF BASIC SCIENCE STUDENTS IN ABUJA MUNICIPAL AREA COUNCIL, NIGERIA

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Abstract
This study investigated the effects of Student Teams Achievement Division (STAD) Cooperative Learning Strategy, Demonstration Methods and Gender Disparity on the achievement of Basic Science Students in Abuja Municipal Council Area. A quasi experimental design with pre-test, post-test, experimental and control groups were used. The population of the study comprised all Junior Secondary Schools in Abuja Municipal Council Area. Three schools were chosen from which three intact classes of 191 students were randomly sampled from the 48 Junior Secondary Schools in Abuja Municipal Council Area. Basic Science Achievement Test (BSAT) which was the instrument used for data collection consists of 30 test items and a reliability index of 0.71. Students in two experimental groups were taught using STAD cooperative learning strategy and demonstration methods respectively while students in the control group were taught using the lecture method. Pre-test was administered to students in all groups before teaching commenced, and after the teaching and experiment, a post-test was administered. Four research questions guided the research. Four research hypotheses were stated and tested at0.05. Data obtained were analyzed using mean, standard deviation and ANCOVA. It revealed that STAD Cooperative Learning Strategy was more effective for teaching Basic Science than the Demonstration method. The study further revealed that the Cooperative Strategy was more effective for both male and female students than the Demonstration Method of teaching.It was recommended among others that STAD Cooperative Learning be adopted in the teaching of Basic Science in Junior Secondary Schools.

Keywords: Effect, Cooperative Learning Strategy, Demonstration Method, achievement, Basic Science

Introduction
Science is crucial to the development of every society. Science educators significantly contribute to the development of scientifically literate persons who further use the achievement and experiences in science and technology for the benefit of mankind. According to Ivowi (2003) the measure of scientific and technological knowledge of the citizens in a nation determines the level of development of that nation. The Federal Government, aware of the power science education has in the development of the nation technologically and industrially, has encouraged and vigorously pursued an increased participation and academic achievement of students in the sciences.

Science advancement has been seen as the single most important factor in sustained economic growth. According to Godek (2004), only science education can bring about significant development. It has also been described as the most important factor that has led to the

improved living standard and growth of developed nations economically. Bilesanmi-Awoderu (2006) noted that concerted efforts should be put into science education, as it is the major factor that will guarantee a nations scientific advancement and hence its development.

Basic science, which is the first form of science a child encounters in the primary and secondary school was formerly called Integrated Science. It prepares students at the Primary and Junior Secondary School level for the study of core science subjects at the Senior Secondary School level (Olanrewaju, 1994). This implies that for a student to be able to study single science subjects at the Senior Secondary School level successfully, such student had to be well grounded in Basic Science at the Junior Secondary School level. In view of this, Basic Science is given great emphasis in the Junior Secondary School curriculum. The principal reasons Nigerian Government introduced Basic Science teaching in Nigerian secondary schools are as follows:

(i) To provide students at the Junior Secondary School level a sound basis for continuing science education either in single science subjects or further integrated sciences;
(ii) To enhances the scientific literacy of the citizenry;
(iii) To allow students understand their environment in its totality rather than in fragments;
(iv) To allows the students to have a general view of the world of science;
(v) The processes of science serve as unifying factor for the various science subjects. (Federal Ministry of Education, 1984).

Studies in Basic Science education have reported that many students at the Junior Secondary School level have developed negative attitudes towards the subject and, because of their dismal performance in the subject, are not benefiting much from the basic science curriculum (Afuwape, 2003; Afuwape and Olatoye, 2004; Odetoyinbo, 2004).

While other factors for poor performance cannot be ignored, evidence from research shows that if teaching methods are improved, achievement can be higher (Daramola and Asuquo, 2006). Research studies have also emphasized that teachers should shift the present overwhelming emphasis on learning facts to the use of effective critical thinking as the primary tool of learning (Zoller, Ben-Chaim, & Ron, 2000) and students should be encouraged to take an active role in creating understanding and problem solving (Baker et al., 2008; Herman & Knobloch, 2004; Parr & Edwards, 2004) which cooperative learning and demonstration methods do. In a world of rapidly changing technologies, the student must be able to construct viable knowledge and adapt.

Researches carried out by (Ajiboye & Ajitoni, 2008) and Akpan (2010) have shown that students perform better when they partake completely in the learning process; that is when they ask questions, collect data, do experiments, analyze collected data, draw conclusions from their experiments, make mistakes and correct the mistakes themselves in view of the new information and proof they discovered. This pedagogic concept should be participatory through social interaction, togetherness, and action-oriented communication.

Cooperative Learning (CL) is one of such teaching strategies. CL is a teaching strategy developed by Allport, Watson, Shaw, and Mead. They were social theorists who found that, students achieve more in terms of quality, quantity and productivity when they work in groups than when they work alone. CL is a teaching strategy which involves organizing students into small groups aimed at the same goal. In this strategy, students are accountable for their

learning and the learning of their group members, hence they have to work together to achieve a common interest. The fundamental elements involved in the use of every CL are:

(i) Positive Interdependence: This occurs when academic gains of individuals or teams are positively correlated.
(ii) Individual Accountability: This occurs when all students in a group are held accountable for doing a share of the work and for mastery of the material to be learned.
(iii) Equal Participation: This occurs when each member of the group is afforded equal shares of responsibility and input.
(iv) Simultaneous Interaction: This occurs when class time is designed to allow students interaction during the period.
(v) Grouping processing: This occurs when group members interact on how much of their goals are being achieved while also maintaining good working relationships.

The lecture method begins with the instruction of the teacher, then practice of students. In this teaching approach, students passively receive information from the teacher and internalize it through some form of memorization. This process is characterized as traditional learning. Although lecture learning has been the dominant teaching method, many educators argue that students require more than a mere transfer of knowledge. The search for ideal approaches to teaching science education has led educators to explore many different teaching techniques, ranging from the traditional lecture class to various experimental approaches such as demonstration, cooperative learning and other types of active learning. Teachers behaviour occupies a dominant position in the whole learning process (lecture method), which cannot provide students with a chance to active learning and less opportunity to communicate with other students.

Demonstration method of teaching involves showing by reason or proof, explaining or making clear by use of examples or experiments. Put more simply, demonstration means to clearly show. In teaching through demonstration, students are set up to potentially conceptualize class material more effectively. Demonstrations can occur when students have a hard time connecting theories to actual practice or when students are unable to understand application of theories. Teachers not only demonstrate specific learning concepts within the classroom, they can also participate in demonstration classrooms to help improve their own teaching strategies.

Gender is the psychosocial aspect of maleness and femaleness. It is a social construct that connotes the differentiated roles and responsibilities of men and women in a particular society. It is dynamic and socially determined by political, cultural and economic systems of the society (Imogie & Eraikhumen, 2008). Gender is seen as a learned socially constructed conditions ascribed to males and females (Offorma, 2004). The issue of low female involvement in science is a concern to many. Texts have shown that gender could influence human conduct. Many people believe that males do better than females in sciences. The sciences are seen as difficult subjects that can be studied better by males. Some believe that males have more time than females because females perform domestic chores. Studies done by Ugwuanyi and Olokun (2000) showed that, the male enrolment figures surpass those of the females in schools. (Aguele & Uhumniah, 2008; Croxford, 2002; Billings, 2000) demonstrated that male students out performed female students in science subjects while other researchers found that male and female students had similar results in terms of cognitive, affective and psychomotor skills (Arigbabu & Mji 2004; Bilesanmi-Awoderu 2001, 2002, 2004, 2006.)Some traditions limit males or females to certain jobs like catering, farming, teaching, trading, medicine and engineering

(Olatoye & Afuwape, 2004). Findings on gender and students achievements have being conflicting. While Olatoye (2008) found no difference in the science achievement of male and female students, Tamir (1990) found that male students showed higher achievement than female students in Physics. Whereas reports from some studies indicate that some teaching methods are gender sensitive (Adeyemi, 2003), others indicate that teaching methods are not gender sensitive (Oludipe, 2012). This kind of situation therefore, calls for continuous research works on gender and academic achievement.

The purpose of this research work therefore was to compare the effects of Student Teams Achievement Division (STAD) form of Cooperative Learning strategy and Demonstration Method on the academic achievement of Junior Secondary students in Basic Science. Specifically, the study attempted to:

(i) Determine the effects of STAD form of Cooperative Learning strategy, Demonstration and conventional methods of teaching on the achievement of Junior Secondary School students in Basic Science.
(ii) compare the achievement test scores between students taught using STAD Cooperative learning strategy and those taught using Demonstration method.
(iii) determine the effect of gender on achievement of Basic Science students when taught using STAD cooperative learning strategy.
(iv) determine the effect of gender on achievement of Basic Science students when taught using demonstration method.

Research Questions

This study was guided by the following research questions:

(i) What is the mean achievement scores of students taught using STAD cooperative learning strategy, demonstration and conventional method?
(ii) How does the mean achievement scores of students taught using STAD Cooperative learning strategy and compare with those taught using demonstration method.
(iii) What is the difference in the mean achievement scores of basic science students taught using STAD cooperative learning strategy based on gender?
(iv) What is the difference in the mean achievement scores of basic science students taught using demonstration method based on gender?

Research Hypotheses

To achieve the purpose of this study, the following null hypotheses were formulated and tested for the study at $P < 0.05$

Ho_1: There is no significant difference in the mean achievement scores of the students taught by STAD cooperative learning strategy, conventional method and demonstration method.
Ho_2: There is no significant difference in the mean achievement scores of students taught by STAD cooperative learning strategy and the students taught by demonstration method.
$H_{O3:}$ There is no significant difference in the mean achievement scores of of basic science students taught using the STAD cooperative learning strategy based on gender.
Ho_4: There is no significant difference in the mean achievement scores of basic science students taught using the demonstration method based on gender.

Method

The research design employed in this study was quasi experimental research design. Quasi-experimental design was used because of the use of intact classes for the study. Specifically, the non -equivalent pre-test, post-test, control group was employed. This consisted of three instructional groups (STAD cooperative group, Demonstration group and the lecture group as control group).

The sample for this study was 191 Junior Secondary II students spread across three intact classes. The method of sampling used was simple random sampling. Three schools were randomly picked by lucky dip from the list of junior secondary schools in AMAC. In each school an intact J S 2 class was used for the study. Two of these intact classes were assigned by balloting as the experimental groups and were taught using the STAD cooperative method of teaching and the demonstration method while the other which was the control group was taught using the lecture method.

Basic Science Achievement Test (BSAT), which was the instrument used for the study is made up of two sections, A and B. Section A elicited demographic data while section B was made up of 30 multiple choice (A-D) questions based on the content of the topics taught during the research.

Results

The data collected from the investigation are presented according to the research questions and hypothesis formulated for the study

Research Question one: What is the mean achievement scores of students taught using STAD cooperative learning strategy, demonstration and conventional method?

Table 1: Mean Scores and Standard Deviation in BSAT of Students in STAD Co-operative strategy, Demonstration and Conventional Groups

Teaching Method	Type of test	No of students	Mean	Standard Deviation	Mean Gain
STAD Co-operative	Pre-test	64	4.78	2.82	15.74
	Post-test		20.52	3.780	
Demonstration Method	Pre-test	70	3.89	2.356	12.22
	Post-test		16.31	3.763	
Conventional Method	Pre-test	57	4.75	2.960	10.71
	Post-test		15.46	4.310	

Table 1 shows the mean scores and standard deviations of the students in the experimental and control groups. From table 1, it could be seen that the mean scores of students taught with STAD Co-operative strategy was 4.78 and 20.52 in pre-test and post-test respectively, standard deviation of 2.82 and 3.78 with a mean gain of 15.74 in the achievement test. The students who were taught using Demonstration method had mean scores of 3.89 and 16.21 in the pre-

test and post-test, standard deviation of 2.36 and 3.76 respectively with a mean gain of 12.22. For student who taught using Conventional method, it was observed that they had mean scores of 4.75 and 15.46 respectively, standard deviation of 2.96 and 4.31 in the pre and post-tests with a mean gain of 10.71. From this result, students taught with STAD co-operative had a better achievement than those taught with Demonstration method and Conventional method, while students taught with Demonstration method had better achievement than those taught with Conventional method.

Hypothesis One: There is no significant difference in the mean achievement scores of students taught using STAD Co-operative learning strategy, Demonstration and Conventional method.

Table 2: One-way ANCOVA Results on Students' Achievement in BSAT

Source	Type III sum of squares	Df	Mean squares	F	Sig	Result
Corrected Model	1688.95	3	562.984	48.608	0.000	S
Intercept	10040.461	1	10040.461	866.89	0.000	S
Group	836.696	2	417.348	38.034	0.000	S
Pretest	754.065	1	754.065	65.106	0.000	S
Error	2165.845	187	11.582			
Total	61877.000	191				
Corrected total	3845.796	190				

S = Significant at P < 0.05

Table 2 shows the summary of the one way ANCOVA result on students achievement scores in BSAT. The results revealed that the noted differences among the mean achievement scores of the three groups is significant at 0.05 alpha level. This is from the fact that $F_{(2, 187)} = 38.03$ and $p = 0.000 < 0.05$ The null hypothesis was therefore rejected indicating that there is significant difference in the mean achievement scores of students taught using STAD Co-operative strategy, Demonstration and Conventional methods, favoring STAD Co operative strategy.

Research Question 2: There is no significant difference in the mean achievement scores of students taught by STAD cooperative learning strategy and the students taught by demonstration method.

Table 3: Mean Achievement Scores and Standard Deviation of Students in BSAT for Experimental groups.

Teaching Method	Type of Test	No of Student	Mean	Standard deviation	Mean Gain
STAD Co-operative learning	Pretest	64	4.78	2. 84	15.74
	Post test	64	20.52	3. 78	
Demonstration Method	Pretest	70	3.89	2. 36	12.50
	Posttest	70	16.21	3.77	

Table 3 shows the mean scores and standard deviation of students in BSAT for the experimental groups (STAD Cooperative strategy and the Demonstration method students) taught using the STAD Cooperative strategy had mean pretest of 4.78 and a mean post test of 20.52, standard deviation of 2.84 and 3.78 in the pre and post tests respectively and a mean gain of 15.74. The student taught using Demonstration method had a mean pre test score of 3.89 and a mean post test score of 16.21, with a standard deviation of 2.36 and 3.76 for the pre test and post test respectively and a mean gain of 12.22. From this result, students taught using STAD Cooperative Strategy had better achievement than those taught using Demonstration method.

Hypothesis Two: There is no significant difference in the mean achievement scores of students taught by STAD Co-operative learning Strategy and the students taught by Demonstration method.

Table 4: ANCOVA Results on BSAT for STAD Cooperative Learning Strategy and Demonstration Method

Sources	Type III sum of square	Df	Mean square	F	Sig	Remark
Corrected models	880.61	2	440.301	35.655	0.000	s
Intercept	8973.398	1	8973.398	726.64	0.000	s
Method	472.462	1	472.462	38.259	0.000	s
Pretest	262.043	1	262.043	21.220	0.000	s
Error	1617.727	131	12.349			
Total	47220.000	134				
Corrected total	2498.328	133				

Table 4 shows the ANCOVA results on BSAT for STAD Cooperative learning strategy and Demonstration method. The result reveals that the noted difference between the STAD Cooperative method and the Demonstration method is significant at 0.05 alpha level this is because $F_{(1, 131)} = 38.259$ and $p = 0.000 < 0.05$. The null hypothesis was therefore rejected indicating that there is a significant difference in the mean achievement scores of students

taught by STAD Co-operative learning method and the students taught using the Demonstration method favouring STAD Cooperative learning.

Research Question 3: What is the difference in the mean achievement scores of basic science students taught using STAD cooperative learning strategy based on gender?

Table 5:- Mean Achievement Scores and Standard Deviation in BSAT of Male and Female Students in STAD Cooperative Learning Strategy

Gender	Type of Test	No of Students	Mean	Standard Deviation
Male	Pretest	36	4.69	2.71
	Posttest	36	20.92	3.91
Female	Pretest	28	4.89	3.04
	Posttest	28	20.00	3.61

Table 5 shows the mean scores and standard deviations in BSAT of the male and female students taught using STAD Cooperative learning strategy. The table reveals that the male students had a mean score of 4.69 and 20.92 in the pretest and posttest respectively with a mean gain of 16.23 while the female students had a mean score of 4.89 and 20.00 in the pretest and posttest respectively with a mean gain of 15.11.From the result, it shows that male students achieved better than female students when taught using the STAD cooperative learning Strategy

Hypothesis Three: There is no significant difference in the mean achievement scores of male and female students taught using STAD cooperative learning strategy.

Table 6:- ANCOVA Results of Male and Female Students in BSAT for STAD Co-operative Learning Strategy

Source	Type III sum of squares	Df	Mean square	F	Sig	Remark
Corrected model	69.699[a]	2	34.850	2.560	0.086	NS
Intercept	5805.070	1	5805.070	426.49	0.000	S
method						
Gender	15.198	1	15.198	1.117	0.295	NS
Pretest	56.465	1	56.465	4.148	0.46	NS
Error	830.285	61	13.611			
Total	27837.00	64				
Corrected total	899.984	63				

S= Significant at P<0.05

Table 6 shows the ANCOVA results of male and female students in BSAT for STAD Co-operative learning method. The results reveals that the noted difference between the male and female students is not significant at 0.05 alpha level this is from the fact that $F_{(1,61)}$ = 15.198 and P = 0. 295 >α = 0.05. the null hypothesis was therefore not rejected indicating that there is no

significant difference in the mean achievement scores of male and female students taught using STAD cooperative learning strategy.

Research Question Four: What is the difference in the mean achievement scores of basic science students taught using demonstration method based on gender?

Table 7:- Mean Achievement Scores and Standard Deviation in BSAT of Male and Female Students in Demonstration Method

Gender	Type of Test	No of Students	Mean	Standard Deviation
Male	Pretest	38	4.13	2.52
	Posttest	38	16.29	3.74
Female	Pretest	32	3.59	2.15
	Post-test	32	16.12	3.86

Table 7 shows the mean scores and standard deviations in BSAT of male and female students taught using demonstration method. This table reveals that the male students had an achievement mean score of 4.13 and 16.29 in the pretest and posttest with a mean gain of 12.16 while the female had a mean of 3.59 and 16.12 with a mean gain of 12.53. From the result, the male students taught using demonstration method achieved more than the female students.

Hypothesis Four: There is no significant difference based on gender in the mean scores of male and female students taught using demonstration method.

Table 8:- ANCOVA Result on Male and Female Student BSAT for Demonstration Method

Sources	Type III sum of squares	Df	Mean Square	F	Sig	Remark
Corrected model	232.694[a]	2	116.347	10.124	0.000	S
Intercept model	3160.397	1	3160.397	275.014	0.000	S
Gender	4.644	1	4.644	0.404	0.527	NS
Pre-test	232.524	1	232.534	20.534	0.000	S
Error	769.949	67	11.492			
Total	19083.000	70				
Corrected total	1002.643					

S= significant at P< 0.05

Table 8 shows the ANCOVA results of the male and female students BSAT for demonstration method. The results reveal that the noted difference between the male and female students is not significant at 0.05 alpha levels. This is from the fact that $F_{(1,67)}$= 0.404and

P=0.527>α=0.05. The null hypothesis was therefore not rejected indicating that there is no significant difference in the mean achievement scores of male and female students taught using demonstration method.

Discussion

The findings of this study revealed that STAD Cooperative Learning Method has significant effect on students' achievement in Basic Science. This implies that though students would achieve better when Demonstration method is used in teaching Basic Science than when Conventional method is used, STAD Cooperative Learning is a far more effective teaching method than the Demonstration method. These findings are in agreement with that of Chianson, Kurumeh & Obida (2010), who found that students achieved better when taught mathematics using the co-operative learning method. It is also in agreement with the findings of Gambari, Olumorin & Yusuf (2012), who found that learning in computer, supported Co-operative Learning enhanced students performance in Physics. This work also agrees with the findings of Qayyum, Liaquat, Asif and Muhammad (2014), who found that Cooperative learning method was better than the lecture method in the development of academic achievement and academic self- concepts of the students.

Findings from the study also showed that there is no significant difference in the mean achievement scores of male and female students taught using STAD cooperative learning method. Furthermore there is no significant difference in the mean achievement scores of male and female students taught using demonstration method. These findings revealed that teaching methods have no effect on gender. The findings are in agreement with that of Yusuf, Gambari and Olumorin (2012) who found that gender had no effect on students' achievement when taught using CL. It is also in agreement with the findings of Olasheinde and Olatoye (2014) that compared male and female senior secondary school students' learning outcomes in science in Katsina State, Nigeria. Their findings revealed that there were no significant differences between male and female students in overall science achievement in Katsina State. The finding of this work, also is in agreement with that of Fatokun and Omenesa (2015) who found that students' achievement does not depend on gender. The finding however contradicts that of Onyegegbu (2004) who found that girls achieved lower than boys because they interact less.

This also means that STAD CL and Demonstration method is effective for teaching male and female students. However from the results both male and female students achieved higher when taught using STAD CL than the Demonstration method.

Conclusion

Based on the findings of this study the following conclusions are made:

(i) Student taught with STAD Cooperative Learning strategy will achieve better than those taught with Demonstration and Lecture methods. Compared to the Lecture method, students taught using Demonstration method achieved better. Therefore STAD is a more effective strategy for teaching Basic Science than Demonstration and Lecture methods

(ii) There is no significant difference in the mean achievement scores of male and female students taught using STAD cooperative learning method

(iii) There is no significant difference in the mean achievement scores of male and female students taught using demonstration method.

Recommendations

Based on the findings of this study, the following recommendations are made.

(i) Teachers should use STAD Cooperative Learning irrespective of gender to teach Basic Science, as it fosters students' achievement.

(ii) Authors of Basic Science text books should write their text to be students - centered and based on STAD Cooperative Learning strategy.

(iii) Curriculum planners should include the STAD Cooperative Learning strategy when reviewing Basic Science curriculum.

(iv) At the pre-service level, the use and implementation of Cooperative teaching strategies in the classrooms should be emphasized in the methodology courses being offered by the student-teachers; and

(v) At the in-service level, seminars and workshops should be organized by ministry officials, zonal educational authorities, and local educational authorities in order to educate practicing teachers on how to implement STAD Cooperative teaching strategy in schools at all levels.

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INFLUENCE OF DEMOGRAPHIC FACTORS ON THE ENTREPRENEURIAL INTENTIONS OF MOTOR VEHICLE MECHANIC STUDENTS AT TECHNICAL COLLEGE LEVEL IN NIGER STATE

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Abstract
The study was designed to examine the influence of the demographic factors on the entrepreneurial intentions of motor vehicle mechanic students at technical college level in Niger State. One research question and three null hypotheses guided the study. A descriptive survey research design was adopted for the study. The study covered three technical colleges in Niger State one from each senatorial zone. A total of 457 respondents comprising of 386 male and 71 female students constituted the total population for the study. Frequency and percentage count was use to analyzed the demographic data of the respondents collected for the study; while One-way Analysis of the Variance (ANOVA) was used to test the null hypotheses formulated for the study at .05 level of significance. Findings revealed among others that certain factors such as age category, ethnic group and family background influence the entrepreneurial intentions of motor vehicle mechanic students at technical college level. Based on the findings it was recommended that motor vehicle mechanic students at technical college level should be mixed during entrepreneurship programmes with respect to their age category, family background and ethnic group and as this measure will go a long way to facilitate joint practical experimental training and learning that will lead to the discovery of entrepreneurship opportunities upon graduation .

Keywords: Entrepreneurship, Entrepreneurial Intention, Demographic factor, Motor Vehicle Mechanic

Introduction
Entrepreneurship concerns the ability and willingness to take risks and to combine factors of production in order to produce goods and services that can satisfy human wants and create wealth. Entrepreneurship is the process of wealth creation through the creation of value rather than its manipulation. It involves the destruction of existing market structures by the creation of new markets (or reduction in market shares of current leaders) through improvement of existing products or the development of entirely new products (Mike, 2011). Adeyeye (2008), sees entrepreneurship as the process of putting together creative and innovative ideas and putting these with management and organization skills in order to combine man, money, machineries and other resources to meet an identified need and thereby create wealth. It is the introduction of new business activities into the economy to improve the standard of living of the people and make profit. The forgoing clearly revealed that for one as an individual to undertake entrepreneurship opportunities one must develop entrepreneurial intention.

Entrepreneurial intention is defined as the willingness to start own business and to become self-reliant. The intention is generally formed by an individual's approach toward entrepreneurship and the leading social norms attached to entrepreneurship in the future. An entrepreneurial

intention is typically considered to be formed by a person's attitude toward entrepreneurship and the prevailing social norms attached to entrepreneurship in the future. According to Kenneth, Godday & Michael (2013) entrepreneurial intention presumes that new business formation is a deliberately designed behavior and equally considered to be the first step in new formation. Entrepreneurial intention is also considered to be the first step in new business formation (Lee and Wong, 2004).

According to Vineata (2014) entrepreneurial intention has proved to be a primary predictor of future entrepreneurial behavior. Kristiana and Indarti (2004) define entrepreneurial intention as a decision to form a new business venture that is planned rather than being conditioned. An individual may have the potential of being an entrepreneur because of own competency and self efficacy but may not make the transition into entrepreneurship because of a lack of intention. Krueger, Reilly and Casurd (2000) argued that entrepreneurial intention refers to intention to create a new firm or a new value driver within existing organizations. Quan (2012) argued that entrepreneurial intention is of two type: impulsive and deliberate intentions. Impulsive entrepreneurial intention refers to intention without realistic control of business resources. It can be influenced by personal characteristics, culture or demographic factors; while deliberate entrepreneurial intention is the willingness of the individual to venture into business due to the feasibility of entrepreneurial behaviors. It depends on external resources such as prior experience or network building. Although it has also been argued that certain demographic factors influences the entrepreneurial intention of an individual.

Demographic factors refer to socioeconomic characteristics of a population expressed statistically, such as age, sex, education level, income level, marital status, occupation, religion, birth and family background. Certain demographic factors according to Shaila & Mohammad (2017) motivate a person's decision to become an entrepreneur. They further identified age, family background and ethnicity to be the most influential demographic factors that influences one's willingness to become a potential entrepreneur and setup business venture. From the foregoing, it can be seen that for motor vehicle student to be aware of the importance of demographic factor on entrepreneurial intention there must be effective entrepreneurship development programmes.

Entrepreneurship development programmes offers students such opportunities by helping them identify and respond to societal needs. According to Dixxon, Meir, Brown and Custer (2005), entrepreneurship programme provides graduates with competencies that enhance entrepreneurial key skills, intention to create new venture and business ownership. Linan, Chord and Guzman (2008) stated that the information regarding entrepreneurs and new venture creation is obtained through entrepreneurship programme.

Education about entrepreneurship and for entrepreneurship according to Friedrich and Visser (2005), will increase students' interest in becoming entrepreneurs at some stage after graduation. Walstand and Kourilsky (1998) stated that students are introduced into entrepreneurship on the ground of careers. Although, Motor vehicle mechanic trade as a course of at technical college level is faced with number of challenges in entrepreneurship development (Segun & Josephine, 2014). These challenges according to Segun and Jossphine (2014) include: technology dependence, deplorable state of training institutions, lack of dynamic curriculum, negative attitude, and shortage of qualified personnel and inadequate funding of technical institutions. The foregoing clearly revealed that the inclusion of entrepreneurial

intentions as the first step in the entrepreneurship development dimension makes entrepreneurial intentionality of motor vehicle mechanic students the most important step in their career choice.

Motor Vehicle Mechanic trade is one of the Technical Vocational Education programmes which involves the acquisition of scientific knowledge in design, selection of materials, construction, operation and maintenance of motor vehicles. According to National Board for Technical Education (NBTE, 2001) Motor vehicle mechanics trade students are expected to, upon completion of this training, be able to: test, diagnose, service and repair any fault on conventional motor vehicle, and assemble main units and systems to the manufacturers' specifications. Abdulkadir (2011) explained that the objectives of the practical aspect of Motor Vehicle Mechanics at the technical college include the ability of motor vehicle craft trainees to be able to: test, rebuild and replace injector nozzles, dismantle and reassemble carburettor following appropriate procedure, replace major emission control components, diagnose all problems relating to steering, braking and suspension systems, among others.

From the foregoing, it can be seen that motor vehicle mechanic job is enterprising and thus it is expected that with the tremendous role played by demographic factors on the entrepreneurial intention of an individual, motor vehicle mechanic students upon graduation should be wise enough and be able to developed proper entrepreneurial intentions within his/her environment and set up his/her business venture (workshop) to be employed and employed others. It has however been observed that in spite of the tremendous role played by demographic factors on one's entrepreneurial intention, quite a number of graduates of motor vehicle mechanic trade were still dumbfounded about entrepreneurship opportunities available to them upon graduation thereby making them unemployed and unable to employ others. The problem of this study therefore put in a question form: Can demographic factors influence the entrepreneurial intentions of motor vehicle students at the technical college level?

Purpose of the Study

The purpose of this study was to identify the influence of demographic factors on the entrepreneurial intentions of motor vehicle mechanic students at technical college level in Niger State. Specifically, the study sought to:

(i) Determine the influence of demographic factors on the entrepreneurial intentions of motor vehicle mechanic students.

Research Questions

The following research question was answered in this study:

(i) What are the demographic factors that influence the entrepreneurial intentions of motor vehicle mechanic students?

Hypotheses

The following null hypotheses were formulated to guide the study and were tested at .05 level of significance:

(i) There is no significance difference between the mean score of entrepreneurial intention and age category as regards the demographic factors that influence the entrepreneurial intentions of motor vehicle mechanic students ($P<.05$).

(ii) There is no significance difference between the mean score of entrepreneurial intention and family background as regards the demographic factors that influence the entrepreneurial intentions of motor vehicle mechanic students (P<.05).

(iii) There is no significance difference between the mean score of entrepreneurial intention and ethnic group as regards the demographic factors that influence the entrepreneurial intentions of motor vehicle mechanic students (P<.05).

Methodology

A descriptive survey research was adopted for this study. The study was conducted in the three Technical Colleges in Niger State one from each Senatorial Zone. The Technical Colleges are Government Technical College Eyagi-Bida in Zone A, Government Technical College, Minna in Zone B and Government Technical College, Kontagora in Zone C. A total of 457 respondents comprising of 386 male and 71 female students formed the total population for the study. One research question and three null hypotheses were formulated to guide the conduct of study. The age categories in years used for the study are: less than 18, 16-19 and 19-22. Family background was identified in terms of: high income, intermediate income and moderate income; while ethnic group were grouped as Zone "A" mainly Nupe; Zone "B" comprising Gwari and Zone"C" comprising Hausa respectively. Frequency and percentage count was use to analyzed the demographic data of the respondents collected for the study; while One-way Analysis of the Variance (ANOVA) was used to test the null hypotheses formulated for the study at .05 level of significance.

Results

Research Question 1

(i) What are the demographic factors that influence the entrepreneurial intentions of motor vehicle mechanic students?

Table 1: Descriptive Statistics of the Respondents

Descriptive Variables	Frequency	Percentage (%)
Gender		
Male	386	81.6
Female	71	18.4
Age Category		
Less than 18	11	2.85
16-19	354	91.7
19-22	21	5.44
Family Background		
High Income	347	89.9
Intermediate Income	28	7.3
Moderate Income	11	2.85
Ethnic Group		
Gwari (Zone B)	60	15.5
Hausa (Zone C)	79	20.5
Nupe (Zone A)	247	64.0

Table 1 above reveals that 386 (81.6%) of the respondents were male, while 71 (18.4%) were female. This means that more males than females participated in this study. As regards age category, 354 (91.7%) were 16-19 years old, 21 (5.44%) were 19-22 years old while 18 (2.85%) were less than 18 years old. This further means that majority of the respondents were aged between 16-19 years old. Concerning family background, 347 (89.9%) were from high income family, 28 (7.3%) were from intermediate family and 11 (2.85%) were from moderate family. This indicates that majority of the participants were from high income family. Analysis in Table 1 further shows that majority 247 (64.0%) of the respondents were from Zone A, 60 (15.5%) of the respondents were from Zone B while 79 (20.5%) were from Zone C. This means that minority of respondents were from Zone B.

Hypothesis 1
There is no significance difference between the mean score of entrepreneurial intention and age category as regards the demographic factors that influence the entrepreneurial intentions of motor vehicle mechanic students.

Table 2: One-way ANOVA of mean ratings of the respondents on the entrepreneurial intention and age category.

	Age Category (in Years)	Mean	F	Sig
Entrepreneurial Intentions	Less than 18	2.395	1.463	.078
	16-19	2.162		
	19-22	2.101		
	Total	**2.473**		

Table 2 showed that there was no significant difference (P< 0.05) in the mean scores of the respondents. These data supported the hypothesis F = 1.463 and P = .078

Hypothesis 2
There is no significance difference between the mean score of entrepreneurial intention and family background as regards the demographic factors that influence the entrepreneurial intentions of motor vehicle mechanic students.

Table 3: One-way ANOVA of mean ratings of the respondents on the entrepreneurial intention and family background.

	Family Background	Mean	F	Sig
Entrepreneurial Intentions	High Income	3.264	1.974	.069
	Intermediate Income	2.013		
	Moderate Income	2.234		
	Total	**2.503**		

Table 3 showed that there was no significant difference (P< 0.05) in the mean scores of the respondents. These data supported the hypothesis F = 1.974 and P = .069

Hypothesis 3
There is no significance difference between the mean score of entrepreneurial intention and ethnic group as regards the demographic factors that influence the entrepreneurial intentions of motor vehicle mechanic students.

Table 4: One-way ANOVA of mean ratings of the respondents on the entrepreneurial intention and ethic group.

	Ethnic Group	Mean	F	Sig
Entrepreneurial Intentions	Gwari (Zone B)	2.353	1.629	.076
	Hausa (Zone C)	2.605		
	Nupe (Zone A)	2.021		
	Total	**2.326**		

Table 4 showed that there was no significant difference (P< 0.05) in the mean scores of the respondents. These data supported the hypothesis F = 1.629 and P = .076

Discussion

Analysis of the variance (ANOA) was employed to measure the differences between entrepreneurial intentions and the age category, family background and ethic group. Therefore, the analysis in Table 2 shows that there was no significant difference (P<.05) between the entrepreneurial intentions and age category as F-test is 1.463 and the P-value is greater than significant value of .0 5which revealed that age category has influence on the entrepreneurial intentions of motor vehicle mechanic students. It was further revealed that the highest age category of 19-22 has the lowest mean value of 2.101 as compared to other age category of less than 18 and 16-19 respectively. This implies that an entrepreneurial intention increases with the age category of 19-22 indicating the highest entrepreneurial intentions for entrepreneurship opportunity.

Table 3 also reveals that there was no significant difference between the entrepreneurial intentions and family background as F-test is 1.974 with P-value of .069 greater than the significant of .05 which showed that family background influences the entrepreneurial intentions of motor vehicle mechanic students. This is in agreement with the views of Youngb (2013) who opined that the creation of supportive institutions in the society as determinant of entrepreneurship and held that family background is among of those institutions and thus family should generates entrepreneurial activity which according to him should be a reflector of general cultural values. In words of Abdulkadir (2016) value and role expectations of a particular family background are the most determinant in the performance of business entrepreneurial roles. It was also discovered that students from intermediate family background has the lowest mean value of 2.013, while those student form high income family background has the highest mean value of 2.264 with moderate income family background having the score of 2.234.

This means that those students from intermediate family background developed more entrepreneurial intentions compared to those students from highest and moderate income family respectively. Generally, family plays a big role in influencing the intention of a child to start business (Shittu, Suzhou China & Dosunmu, 2014). Corroborating this view Shapero and Sokol (1982) explained that father and mother plays important role as perception of venture feasibility and desirability is concerned. Krueger (1993) however pointed out that family serves a breading ground for would be entrepreneurs as long as it provides the child with efficient and effective role modeling. Similarly, Carr and Sequeira (2007) argued that family background plays major role in shaping entrepreneurial intentions.

Furthermore, the analysis in the Table 4 indicates there was no significant difference between the entrepreneurial intention and ethnics group with the F-test value of 1.629 and P-value of .76 greater that significant level of .05 meaning by ethnic group influences the entrepreneurship intentions of motor vehicle mechanic students. It was further revealed that students from Zone A has the lowest mean value of 2.021, while those from Zone B has mean value of 2.353 with those from Zone C having the highest mean value of 2.605. This implies that motor vehicle mechanic students from Zone A developed more entrepreneurial intentions to entrepreneurship opportunities compare with those from Zone B and C respectively.

Conclusion/ Recommendations

This study examined the influence of the demographic factors on the entrepreneurial intentions of motor vehicle mechanic students at technical college level in Niger State. The findings of the study serve as the basis for making the following conclusion: That motor vehicle mechanic students at technical college level should be mixed during entrepreneurship programmes with respect to their family background, ethnic group and age category as this measure will go a long way to facilitate joint practical experimental learning.

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CORRELATIONAL STUDY BETWEEN CURRICULUM LEARNING OBJECTIVES AND SS II STUDENT'S PERFORMANCE IN ELECTROLYSIS FOR ENHANCING QUALITY EDUCATION IN NIGERIA

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Abstract
Educational objectives can be specified from National level; Institutional level and Instructional level. At the National level are policy statements for national interest and development; at Institutional level we have the curriculum and of the Instructional level we have are learning objectives. This study found out that there is positive relationship between curriculum learning objective and the student's academic performance in Electrolysis. The sample comprised of 161 SS II students clustered randomly selected, 91 male and 70 female. Instrument used for data collection was curriculum stated learning objectives and a constructed Electrolysis Achievement Test (EAT) validated by experts and the reliability was found using Spearman Brown's split-half and obtained a coefficient of 0.69. The stated learning objective were categorized under Newcomb and Trefz (1987) cognitive model and the data obtained from the constructed test (EAT) were analyzed using Analysis of variance (ANOVA), Pearson Product Moment Correlation (PPMC) and Point-Biserial at P≤ 0.05 The result showed that there is a positive relationship between curriculum academic learning objectives and the student's academic achievement in Electrolysis. Recommendations made includes Chemistry teachers should be conducting a thorough check on any stated learning objective by using different concepts and method of Alignment; Alignment gives the teacher opportunity to match objectives with method of instruction and method of Assessment.

Key Words: Curriculum Learning Objectives, Students' Academic Performance and Electrolysis

Introduction
Science has revolutionized man's thinking and behaviour so much so that its meaning and roles it plays in human development has to be made clear. According to John, in Mogbo and Alabi (2012) science is a way of knowing, a systematic method of learning about nature, based on observation and testing leading to the formulation of hypotheses, facts, laws, and theories. Within the context of science education, chemistry has been identified as a very important school subject and its importance in scientific and technological development of any nation has been widely reported. It was as a result of the recognition given to chemistry in the development of the individual and the nation that it is made a core subject among the natural sciences and other science related courses in the Nigerian education system.

Chemistry plays a pivotal role in engineering sustainable economic development and growth in any nation (Ademola & Kenni, 2013). According to Oloruntegbe (2000) there is no aspect of human endeavour on natural phenomena that chemistry does not feature. It features prominently in the areas of oil and gas, agriculture, health, environment, solid minerals, textile, cosmetics, water supply, sanitation, crime detection, paper, waste management e.t.c. Chemistry is the catalyst for sustainable national growth and development.

Chemistry is offered at the senior secondary level in order to help student learn important aspects of scientific concepts that would enable them live effectively in their immediate environment (Adesoji & Olutunbosun, 2008). Despite the importance of chemistry and its educational value which is relevant to the needs of the individual learner, economics and technological breakthrough of a nation, and the effort of researchers to improve on its teaching and learning, the performance of students in the subjects is still not encouraging; this shows that the level of performance is still below expectation.

It is disappointing to note that the students' academic performance in chemistry at internal and external examination has remained considerably poor despite the relative importance of chemistry (Saage 2009). The poor achievement of student in chemistry has continued to be a major cause of concern to all, particularly those in the mainstream of chemical education in Nigeria (Olagunju, Adesoji, Iroegbu & Ige, 2003; Adesoji & Olutunbosun, 2008). Among the factors that have been identified to be responsible for poor achievement in chemistry are poor methods of instruction, teacher attitude (Agoro, 2002), laboratory inadequacy, poor science background (Adesoji, 1999) and non-availability of effective teaching and learning resources in classrooms (Agoro, 2002).

According to Maheshwari **(**2013), educational objectives can be specified at various levels. These levels include the National level, the Institutional level and the Instructional level At the National level, educational objectives are merely policy statements of what education should achieve for the nation. They are in broad outlines reflecting national interests, values, aspirations and goals, which are in the form of the National Policy on Education.

At the Institution level objectives are intermediate. The aims are logically derived and related to both the ones at the national level and the ones at the instructional levels, they are narrowed to achieve local needs like the kinds of certificate to be awarded by the institutions. These institutional objectives are usually specified by an act or edict of the state house of assembly if it is a state government institution, otherwise by an act of the national Parliament**.** Since the schools are institutions consciously created to ensure desirable changes in human behaviour towards the ultimate realization of the national goals, they have to make conscious efforts to ensure the attainment of the goals. This can be done through a systematic translation of these objectives by teachers instructional objectives. Here, educational objectives are stated in the form in which they are to operate in the classroom. They are therefore referred to as instructional objectives; they are specifically based on the intended learning outcomes.

The teacher is the most indispensable factor in effective administration of any educational system. Also, it has been established that no amount of resources put into the nation education system can achieve any tangible result without adequately prepared and motivated teachers. The role of teachers at all levels of education is emphasized in the National Policy on Education (FRN, 2013) that no educational system may rise above the quality of its teachers. Chapman, Gellert, and Hernández, (2012) conceptualized teachers' effectiveness as the managerial skills essential for enhancing classroom control and discipline. It is the teachers' competence, ability, resourcefulness, and ingenuity through effective utilization of appropriate language, methodology and available instructional materials that could bring out the best from the learners in term of academic achievement.

A number of activity-oriented instructional strategies have been advocated for curriculum designers and science education (Eniayeju, 2001), to help improve on the failure rate among secondary school science students. Example of these strategies include guided discovery approach, demonstration method, discussion method, and problem-solving for teaching chemistry at senior secondary schools stipulated in the National Policy of Education (FRN, 2013). Thorndike (1913), who investigated principles of learning which could be directly applied to the teaching process (i.e., the laws of effect and exercise), developed a body of instructional design principles that included task analysis and teaching methods based on his research findings and student evaluation methods.

This research used Newcomb and Trefz (1987) model as a framework for categorizing cognitive level of learning. Agricultural educators Newcomb and Trefz with consultation from Krathwohl, one of the contributors of Bloom's taxonomy, condensed Bloom's taxonomy from six levels to four levels: Remembering, Processing, Creating, and Evaluating. Minimal explanation was given as the rationale behind the change. Johnson, Melin and Whittington (2003) inferred a further dichotomy of the model into lower-order thinking skills (remembering and processing) and higher-order thinking skills (creating and evaluating). Lin, McKeachie, and Kim (2003) stated that lower level of cognitive process includes knowledge, comprehension, application; and the higher level includes synthesis and evaluation.

Statement of Problem

Osuafor in Obomanu and Onuoha (2012) stated that factors that have been identified by some science education researchers were among others, poor methods of instruction. According Dawson in Obomanu and Onuoha (2012) stated that effective correlation of students' achievement in chemistry have indicated that generally, many students and even teachers perceive chemistry as one of the most difficult subjects to study at all levels of schooling.

According to Obomanu and Onuoha (2012) Nigerian students do not only find science subjects very difficult but uninteresting and that the few students that enroll for science, sometimes perform poorly as exemplified in their consistent poor performance in school certificate examinations. The table below indicated the failure as stated by WAEC on chemistry subject in Kaduna state:

Table 1: Kaduna State Students Performance in Chemistry at WAEC (2010 – 2017)

Year	PASS at Credit Level (%)	Rate of Failure (%)
2010	43.42	56.58
2011	18.50	81.50
2012	19.00	81.00
2013	25.61	74.39
2014	23.89	76.11
2015	34.76	65.24
2016	38.42	61.58
2017	36.66	63.34

Source: WAEC Chief Examiners' Reports (2010 – 2017).

Objectives of the Study

The objectives of the study were postulated as follows:

(i) To determine the relationship between curriculum learning objectives and students' academic achievement in Electrolysis.

(ii) To determine the relationship between students' academic achievement in Electrolysis among the selected schools.

(iii) To determine the relationship between male and female academic achievement in Electrolysis.

Research Questions

(i) What is the relationship between curriculum learning objectives and students' academic achievement in Electrolysis?

(ii) What is the relationship between students' academic achievement in Electrolysis among the selected schools?

(iii) What is the relationship between male and female academic achievement in Electrolysis?

Research Hypotheses

The following null hypotheses were stated and tested:

H_{01} There is no significant relationship between curriculum learning objectives and the students' academic achievement in Electrolysis.

H_{02} There is no significant relationship between students' academic achievement in Electrolysis among the selected schools.

H_{03} There is no significant relationship between male and female academic achievement in Electrolysis.

Methodology

Research Design

The study used descriptive survey design which involved two processes: collection of national learning objectives on Electrolysis from the curriculum were categorized on Newcomb and Trefz (1987) cognitive model; administration of achievement test on their students to determined the correlation between the national instructional objectives and student academic achievement.

Table 1: Population of SS II Students offering Chemistry in Zaria Educational Zone

S/N	NAME OF SCHOOL	MALE	FEMALE	TOTAL
1.	G.S.S., Zaria (SNR)	80	63	143
2.	G.S.S, Muchia (SNR)	100	80	180
3.	G.S.S, Chindit (SNR)	61	38	99
4.	G.S.S, T/Saibu (SNR)	60	40	100
5.	G.S.S, Magajiya (SNR)	30	60	90
6.	G.S.S, Aminu (SNR)	30	30	60
7.	G.S.S, Kaura (SNR)	40	60	100
8.	G.S.S, Pada (SNR)	30	40	70
9.	G.S.S, D/Bauchi (SNR)	100	80	180
10.	G.S.S, K/Kuyambana (SNR)	20	15	35
11.	G.S.S, Diriya	30	15	45
12.	G.S.S, Kugu	25	10	35
13.	G.S.S, Dakace	25	18	43
14.	G.S.S, Gimba	30	40	70
15.	G.S.S, Awai	50	60	110
16.	G.S.S, T/Jukun	16	40	56
17.	G.S.S, Yakasai	20	40	60
18.	G.S.S, Likoro	30	60	90
19.	Alhuda Huda, Zaria	300	-	300
20.	Science Secondary School	300	-	300
21.	G.G.S.S, Zaria	-	200	200
22.	G.G.S.S, K/Gayan	-	100	100
	TOTAL	**1377**	**1089**	**2466**

Source: Zonal Education, Zaria, 2017

Sample of the Study

The sample of the study consisted of three schools stratified clustered randomly selected consisted of 161 students in line with the Central Limit Theorem; comprises of 70 female and 91 male students. The following illustrate the sample of the study:

Table 2: Sample of the Study

School	Type	Number
1. Alhuda Huda, Zaria	male only	300
2. G.G.S.S, Zaria	female only	200
3. G.S.S, Muchia (SNR)	co-school	180
Total		**680**

Instrumentation

A constructed Electrolysis Achievement Test (EAT) adopted from past WAEC question papers (2010 – 2017) on Electrolysis was used and administered on the students comprises of 20 objective test items 4 options (A-D) and the second instrument was a hand written learning objectives by the teachers of the sampled schools.

Validation of Instrument
Content validation was established with aid of table of specification from the National learning objectives on Electrolysis and content of Electrolysis all stipulated by National Curriculum for Senior Secondary Schools (2012).

Reliability of Instrument
Pilot test of the constructed Electrolysis Achievement Test (EAT) was conducted on a group of 30 students that offered chemistry as a subject in SS II at a Government Senior Secondary School, on Test-Retest method . Spearman Rank Correlation Formulae was used on the two results. Reliability of 0.69 was obtained.

Procedure of Data Collection
The processes started with a description about the research to the teachers of the sampled schools who were asked to teach all sub-topics on Electrolysis, while the National learning objectives were collated from the curriculum. After three weeks when all the sub-topics were taught by the teachers, the students were tested with the constructed test (EAT)

Results
Presentation of Data Collected
Table 3 contains analysis of curriculum learning objectives on the scale of Newcomb and Trefz (1987) cognitive model. The following figures were obtained.

Table 3: Presentation of Curriculum Learning Objectives across Newcomb and Trefz Cognitive model

Cognitive Level	Number of Objectives	Percentage
Remembering	4	26.67%
Processing	6	40.00%
Creativity	2	13.33%
Evaluating	3	20.00%
Total	**15**	**100%**

Table 4: Presentation of Students' performance across Newcomb and Trefz cognitive model

Level of Cognition	No. of students answered	Percentage
Remembering	61	37.90%
Processing	48	29.74%
Creativity	36	22.16%
Evaluation	16	10.20%
Total	**161**	**100.00%**

Table 4 above is presentation of students academic achievement at various levels of Newcomb and Trefz (1987) cognitions; the mean percent of each correctly answered question.

Table 5 below reveals the mean percent of students' academic achievement among school selected at various cognition of Newcomb and Trefz model.

Table 5: Mean Percent of Sampled Schools Performances on Cognitions.

School	Remembering	Processing	Creativity	Evaluation
Alhuda Huda, Zaria	35.00%	21.67%	16.67%	11.67%
G.G.S.S, Zaria	34.09%	45.46%	22.73%	09.09%
G.S.S, Muchia (SNR)	43.86%	26.32%	28.07%	08.77%

Table 6: Presentation of Male and Female Performance across Newcomb and Trefz cognitive model

Level of Cognition	Male	Female
Remembering	40.08%	39.07%
Processing	37.12%	35.69%
Creativity	18.09%	20.02%
Evaluation	4.71%	5.02%
Total	**100.00%**	**100.00%**

Table 6 above showed mean percent of male and female academic achievements taken for those that answered each level of cognition correctly.

Hypotheses Tested

The Hypotheses were tested with Pearson Product Moment of Correlation (PPMC), ANOVA and Point-Biserial respectively at 5% (α=0.05) confidence level, using two-tailed test. The following analyses were obtained:

H_{01} There is no significant relationship between curriculum learning objectives and the students' academic achievement in Electrolysis.

Table 7: Correlation of curriculum learning objective and Students performances

Test	Mean	SD	S.E	PPMC	P value
Learning objectives	3.75	1.71	0.85391	0.841	0.009
Students Performance	40.25	19.12			

From the result obtained in Table 7, a calculated correlation coefficient of 0.841 was obtained and P value of 0.009 is less than P 0.05 which shows there is a positive relationship between learning objectives and the students' academic achievement.

H_{02} There is no significant relationship between students' academic achievement in Electrolysis among the selected schools.

To test this, a statistical tool Analysis of Variance (ANOVA) at P≤ 0.05 was taken for the schools selected and the following results were obtained:

Table 8: Analysis of variance among school performances

Test	Sum of squares	df	Mean square	F	P value
Between group	365.583	3	121.861	9.255	0.006
Within group	105.333	8	13.167		
Total	470.917	11			

From the result in Table 8, the F ratio was 9.255 and P value of 0.006 at df = 8 for within group and 3 for between groups. Since the P value observed was less than (P≤ 0.05) the null hypothesis was rejected.

H_{03} There is no significant relationship between male and female academic achievement in Electrolysis.

From the test scores obtained; a statistical correlation formulae point-Biserial was used to calculate the relationship between male and female academic performances which showed there is positive relationship as follows:

Table 9: Point-Biserial correlation between male and female performances

Gender	Mean	SD	r_{pb}-value
Male	60.83	3.12	0.58
Female	57.22	3.75	

Summary of the findings

The results in Table 3, 4 and 7 showed that there was significant relationship between curriculum learning objectives and their students' academic achievement in Electrolysis. Most of teachers' learning objectives were targeted at the lower-order of thinking (knowledge, comprehension, and application) and their students performed in relation to such objectives. This finding is consistent with Newman (2005) who contrasted lower-order of thinking and higher-order of thinking (synthesis and evaluation) and stated that: lower-order thinking demands only routine, mechanistic application of previously acquired knowledge. In contrast, higher-order thinking challenges students to interpret, analyse, or manipulate information.

The result in Table 5, and 8 showed that there was significant relationship between students' academic achievement in Electrolysis among the selected schools. This finding supports Anderson, Krathwohl, Airasian, Cruikshank, Mayer, Pintrich and Wittroch (2001), who stated that one of the methods of modelling a classroom culture for learning is suggested by the concept of alignment. Alignment refers to the degree of correspondence between learning objectives, method of instruction and forms of assessment.

Lastly, the result in Table 6, and 9 showed there was significant relationship between male and female academic achievement in Electrolysis. This finding confirms research by by Hyde (1991)

which stated that if gender difference do exist, these difference would account for only 1 percent of the variation in quantitative ability that we see in our population.

Conclusion

From the findings in this research it may be concluded that students performed mostly the way they were taught on a particular topic or subjects. Also, students guided in their study by a preponderance of Analysis and Evaluation question will scored significantly at the higher-order than those guided by a preponderance of Knowledge- type question written for the same subject or topic. Lastly, the level of learning objectives where a teacher asks questions has a direct relationship to the cognitive level which his students employed to arrived at responses to the question.

Recommendations

Based on the aforementioned research findings the following recommendations were made:

(i) Chemistry teachers should be conducting a thorough check on any stated learning objective by using the concept of Alignment. Alignment gives the teacher opportunity to match objectives with method of instruction and method of Assessment.

(ii) The school board or authority (Principals, Ministry of Educations) should provide necessary resources to the school, such as practical materials for achieving learning objectives at the higher-order of thinking (creativity).

(iii) Seminar and workshops for teachers should be organized by Government and NGOs at the federal, state and local government levels on different teaching approaches that will encompass the achievement of both lower-order (knowledge, comprehension and application) learning objectives and higher-order (synthesis and evaluation) learning objectives within the lesson time frame.

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EFFECT OF LABORATORY-BASED INSTRUCTION ON ACADEMIC ACHIEVEMENT IN NUTRITION CONCEPTS AMONG SECONDARY BIOLOGY STUDENTS IN GIWA EDUCATIONAL ZONE, KADUNA STATE, NIGERIA.

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Abstract
This study investigated the effect of Laboratory-Based Instruction on academic achievement in Nutrition Concepts among secondary Biology students in Giwa Educational Zone, Kaduna State, Nigeria. A total of 1,442 SS2 Biology students from 16 public Senior Secondary Schools in Giwa Educational Zone constituted the population. A sample of 181 students from two randomly selected co-educational schools was used for the study. A validated instrument called Nutrition Concept Achievement Test (NCAT) with reliability co-efficient of 0.86 was used for data collection. Three research questions and three hypotheses guided the study. Research questions were answered using mean and standard deviation statistics while the null hypotheses were tested using Analysis of Covariance (ANCOVA) at 0.05 level of significance. The findings revealed that students taught using Laboratory-Based Instruction performed significantly better than those taught using Traditional Lecture Method; Male students in the experimental group are not significantly different from their female counterparts in their academic achievement; and there is no significant interaction effect of instructional strategy and gender on students' academic achievement in Nutrition concepts. It was therefore recommended among others that NGOs, Parent-Teachers Association as well as able philanthropists should in conjunction with Federal and State Governments provide funds to help equip the schools with adequate laboratory facilities for effective teaching and learning of Biology.

Introduction
Science is an instrument par excellence for fast-tracking national development. According to Amadalo, Ocholla and Memba (2012), science plays important and dominant roles in spearheading technological advancement, promoting national wealth, improving health, accelerating industrialization and ensuring food security in the advanced nations of the world. On the other hand, Science, Technology, Engineering and Mathematics (STEM) education are instrumental to the development of any nation as it is the reason behind the success in science and technology in the developed world. In fact, Bala (2018) noted categorically that any country that aspires to address the problems of under-development must put science and technology at the fore front of every educational program.

Biology is one of the science subjects included in the national science education curriculum (Ezenduka, Achufusi & Okoli, 2014) and it is such an important subject that it is taught at schools and universities around the world (Ejilibe, 2012). According to Ejilibe (2012), Biology is a natural science which studies living organisms and how they interact with each other in their

environment. It examines structure, function, growth, origin, evolution and distribution of living things. Being an applied field of study, the knowledge of Biology is essential in improving the quality of life and the socio-economic development of a nation as its principles are utilized in the field of Medicine, Pharmaceutical Sciences, Agriculture, Biotechnology and Forensic Sciences (Ejilibe, 2012; Ezenduka, Achufusi & Okoli, 2014).However, researchers such as Usman and Lawal (2017) and Salisu (2018) have reported poor performance of students in Senior Secondary Certificate Examination (SSCE) Biology. The observed failure of students has been attributed by these researchers mainly to inappropriate method of teaching like the Traditional Lecture Method and poor laboratory facilities in schools.

According to Ezenduka, Achufusi and Okoli (2014), the Traditional Lecture or Expository Method is a teacher-centered method of instruction which concerns mainly verbal presentation of subject matter. The teacher only presents lessons without any hands-on or practical activity to the students. Salisu (2018) considers Lecture Method as a method of teaching that emphasizes "talk and chalk" in the teaching of science subjects. Usually in teaching with Lecture Method, the teacher stands in the front of the classroom and dictates information relevant to the course content while students only listen and take down notes and are not encouraged to ask questions (Ezenwosu & Nworgu, 2013). Ezenwosu and Nworgu (2013) also added that this method is concerned with how much ground is covered by the teacher before an examination, making it seemingly attractive to the teacher considering the examination oriented nature of the Nigerian educational system. Therefore, the teachers' decision to use Lecture Method is not predicated on its effectiveness in enhancing academic achievement or consideration for the gender of the students the lesson is meant for, but on the fact that it is cheaper and easier to undertake as well as leads generally to adequate coverage of the syllabus (Ezenwosu & Nworgu, 2013; Salisu 2018).

The Laboratory-Based Instruction on the other hand, is a child-centered and activity-based teaching method that engenders active student participation in the instructional process which ultimately results in better understanding and mastery of subject matter as well as increased academic performance in the subject (Oluwasegun, Ohwofosirai & Emagbetere, 2015).A laboratory has been described by Oluwasegun et al. (2015) as a room or building specially meant for teaching by demonstration of theoretical phenomena into practical terms. It consists of various tools and equipment used by scientists or science students either for the finding of new knowledge or to ascertain previous findings. Jenkins (2015) stated that laboratory teaching and experiments encourage deep understanding and retention of scientific concepts; allow for seeing, handling and manipulation of real objects and materials; make science interesting and effective for students; as well as encourage students to make significant contributions in the field science later in life. Studies such as Khan, Muhammad, Ahmed, Saeed and Khan (2012), Ajayi and Osoko (2013), Oluwasegun et al. (2015), Alake (2015), Ng'ethe (2016), Mwangi (2016) and Usman and Lawal (2017) have revealed that exposing secondary school students to practicals or activity-based strategies like Laboratory-Based Instruction fosters their academic performance in science education disciplines such as Basic Science, Biology, Chemistry and Physics.

Gender is the societal meaning assigned to male and female with the particular role that each should play (Ezenwosu & Nworgu, 2013). According to Ajayi and Osoko (2013), the issue of gender and gender stereotyping permeate every aspect of human endeavour especially in the Nigerian educational sector. In fact Ezenwosu and Nworgu (2013) stated that there is a general

belief among Nigerians that males are superior to females in terms of cognition, logical reasoning and academic achievement which further reinforces the belief that science education disciplines like Physics, Mathematics are male dominated subjects. This discrimination against females has created gender gaps in STEM classrooms with females lagging behind (Aniodoh and Eze, 2014). However, the gender differences are not inborn but are learnt as adult members if the society socialize the young ones. Science education researches on gender and academic achievement such as those of Olorukooba, Lawal and Jiya (2012) and Umar (2013) revealed that boys achieved better than girls. On the contrary, studies by Bunkure (2012) and Dahiru (2013) pointed out that girls achieved better than boys. However, a number of other studies like Ajayi and Osoko (2013), Ezenwosu and Nworgu (2013) and Lawal and Usman (2018) revealed no significant difference in the academic achievement of male and female students. Therefore, the effect of gender on students' academic achievement in science education has remained a subject of debate with no definite conclusion backed-up with empirical evidence. Hence, this study seeks to investigate the effect of Laboratory-Based Instruction on male and female SS2 Biology students' academic achievement in Nutrition concepts as well as examine the interaction effect between instructional strategy and gender on students' academic achievement in Biology.

Statement of the Problem

The Senior Secondary Biology Curriculum, according to the National Educational Research and Development Council (NERDC, 2009), should prepare students to acquire adequate laboratory and field skills as well as meaningful and relevant knowledge ofthe subject-matter. However, Ezenwosu and Nworgu (2013) noted categorically that despite the various methods of science teaching employed in teaching Biology in secondary schools, students achievement continue to deteriorate yearly. Consequently, this gap pose a threat to the number of students that gain admission into Nigerian universities to run programmes in the field of Human and Veterinary Medicine, Nursing, Pharmacy, Biotechnology and Molecular Biology among others (Ogbonna, 2009). In a quest to unravel the reasons behind these poor academic achievements, Adeyegbein Ezenwosu and Nworgu (2013) as well as WAEC Chief Examiners' Report (2015) observed that Nigerian students especially in Biology demonstrate shallow knowledge, poor mastery and poor retention of scientific concepts. Ezeugwu (2009), in his own study identified poor teaching methods and inadequate laboratory facilities as some of the major factors responsible for poor students' academic achievement in Biology.Therefore, it is only when teachers use effective teaching methods that are essentially child-centered and activity-based that the problem of students' mastery of subject matter could be addressed and their poor academic achievement in Biology, remedied. Hence, this study seeks to investigate the effect of Laboratory-Based Instruction on academic performance in Nutrition Concepts among secondary Biology students in Giwa Educational Zone of Kaduna State, Nigeria.

Objectives of the Study

The study has the following objectives:

(i) to find out the effect of Laboratory-Based Instruction on SS2 Biology students' academic achievement in Nutrition concepts;

(ii) to determine the effect of Laboratory-Based Instruction on academic achievement of male and female SS2 Biology students in Nutrition concepts;

(iii) to examine the interaction effect of instructional strategy and gender on academic achievementof SS2 Biology students in Nutrition concepts.

Research Questions

The following research questions were formulated to guide the study:

(i) What is the difference in the mean academic achievement scores of SS2 Biology students taught Nutrition Concepts using Laboratory-Based Instruction and those taught the same concept using Traditional Lecture Method?

(ii) What is the difference in the mean academic achievement scores of male and female SS2 Biology students taught Nutrition Concepts using Laboratory-Based Instruction?

(iii) What is the interaction effect of instructional strategy and gender on the mean academic achievement scores of SS2 Biology students in Nutrition Concepts?

Research Hypotheses

The following null hypotheses were formulated and tested at $P \leq 0.05$ level of significance:

HO_1: There is no significant difference in the mean academic achievement scores of SS2 Biologystudents taught Nutrition Concepts using Laboratory-Based Instruction and those taught the same concept using Traditional Lecture Method.

HO_2: There is no significant difference in the mean academic achievement scores of male and female SS2 Biology students taught Nutrition Concepts using Laboratory-Based Instruction.

HO_3: There is no significant interaction effect of instructional strategy and gender on the mean academic achievement scores of SS2 Biology students in Nutrition Concepts.

Methodology

The design for this study is quasi-experimental, employing the pretest-posttest, non-equivalent control group design. Two intact classes were used. This was to prevent disorganization of classes. The population for the study comprised all Senior Secondary Schools II (SS2) Biology students in Giwa Educational Zone of Kaduna State, Nigeria. These make up a total of 1,442 students out of which 181 (101 male and 80 female) students were selected randomly to serve as the sample for the study. The study sample comprised two intact classes from two co-educational Senior Secondary Schools in the study area. The sampling technique involved pretesting students in four co-educational schools and subjecting their scores to One-Way Analysis of Variance (ANOVA). To ensure unbiased selection of two schools that are not significantly different in terms of academic performance, the ANOVA result was subjected to scheffe's post-hoc test.An intact class was selected from each sampled school by simple balloting. One intact class was randomly assigned as the experimental group while the other was assigned as the control group. The same achievement test was administered to the students in the two groups as pretest. Laboratory-Based Instruction was employed in teaching the experimental group the concept of Nutrition for six weeks while Traditional Lecture Method was used to teach the control group. At the end of the six weeks treatment, the initial test (with items reshuffled) was administered to the two groups as posttest.

The instrument used by the researchers for data collection is the Nutrition Concept Achievement Test (NCAT) which was generated from the West African Examinations Council (WAEC) Biology past questions. Despite using standardized questions from this examination body, the instrument was given to five experts for validation. The validators include one Professor and one Senior Lecturer in the Department of Science Education, Ahmadu Bello University, Zaria; a Professor in the Department of Educational Psychology, Guidance and Counselling, Ahmadu Bello University, Zaria as well as two secondary school Biology teachers with at least B.Sc. (Ed) Biology and five years teaching experience each. Their observations, suggestions and

recommendations regarding the face, content, construct and criterion validity of the test items were noted to produce the final version of NCAT used for both pretest and posttest. Its reliability coefficient is 0.86 and was determined using Kuder-Richardson K-R20 method.

The data collected from the pretest and posttest were analysed using mean and standard deviation statistics for answering the research questions while Analysis of Covariance (ANCOVA) was employed for testing the null hypotheses at P $\leq$0.05 level of significance. ANCOVA was used to statistically control any effects of initial group differences between the intact groups since randomization was not possible as well as statistically control the effects that the pretest may have on the posttest scores of the students.

Results

The results for this study are presented as follows:

Research Question One: What is the difference in the mean academic achievement scores of SS2 Biology students taught Nutrition Concepts using Laboratory-Based Instruction and those taught the same concept using Traditional Lecture Method?

Table 1: Mean and Standard Deviation Statistics of Students Scores in the Experimental and Control Groups.

Instructional Strategy	N	Pretest		Posttest		Mean Gain
		Mean	SD	Mean	SD	
Laboratory-Based Instruction	83	13.43	3.35	23.36	3.80	**9.93**
Traditional Lecture Method	98	13.50	3.33	19.94	3.00	**6.44**
Mean Difference		**0.07**		**3.42**		**3.49**

Table 1 shows that the experimental pretest and posttest mean scores are 13.43 and 23.36 with standard deviation scores of 3.35 and of 3.80 respectively. However the control group has pretest and posttest mean scores of 13.50 and 19.94 with standard deviations scores of 3.33 and 3.00 respectively. The mean achievement gain for the experimental group is 9.93 while the mean gain in the control group is 6.44 indicating the superiority of Laboratory-Based Instruction over Traditional Lecture Method in fostering students' academic achievement in Nutrition Concepts.

Research Question Two: What is the difference in the mean academic achievement scores of male and female SS2 Biology students taught Nutrition Concepts using Laboratory-Based Instruction?

Table 2: Mean and Standard Deviation Statistics of Male and Female Students' Scores in theExperimental Group.

Instructional Strategy	Gender	N	Pretest		Posttest		Mean Gain
			Mean	SD	Mean	SD	
Laboratory-Based Instruction	Male	45	13.47	3.04	23.69	3.92	**10.22**
	Female	38	13.39	3.73	22.97	3.66	**9.58**
	Mean Difference		**0.08**		**0.72**		**0.64**
Conventional Lecture Method	Male	56	13.54	3.18	19.66	2.73	**6.12**
	Female	42	13.45	3.55	20.31	3.33	**6.86**
	Mean Difference		**0.09**		**0.65**		**0.74**

Table 2 shows that the pretest mean scores and standard deviation scores for the experimental male and female students are 13.47 and 3.04; 13.39 and 3.73 respectively. Similarly, the posttest mean scores and standard deviation scores for the experimental male and female students are 23.69 and 3.92; 22.97 and 3.66 respectively. The mean achievement gains for male and female students in the experimental group are 10.22 and 9.58 respectively with a mean gain difference of 0.64. This indicates that male students in the experimental group exposed to Laboratory-Based Instruction achieved a slightly higher mean score than their female counterparts. However, a lower standard deviation on the part of the females showed that their scores were more clustered around the mean than those of their male counterparts.

Research Question Three: What is the interaction effect of instructional strategy and gender on the mean academic achievement scores of SS2 Biology students in Nutrition Concepts?

Table 3: Test of Interaction between Method and Gender on Students' Academic Achievement.

Groups	Experimental (Mean Gain)	Control (Mean Gain)
Male	10.22	6.12
Female	9.58	6.86

As shown in Table 3, the mean achievement gains are higher at the two levels of gender in the experimental group(i.e. 10.22 for males and 9.58 for females) than in the control group(i.e. 6.12 for males and 6.86 for females). This implies that thereis no interaction between gender and methods on students' academic achievement in Nutrition Concepts.

Hypotheses Testing: To determine whether the differences in the compared means are significant or not, the students' academic performance scores were subjected to analysis using ANCOVA statistic at $P \leq 0.05$ level of significance.

HO_1: There is no significant difference in the mean academic achievement scores of SS2 Biologystudents taught Nutrition Concepts using Laboratory-Based Instruction and those taught the same concept using Traditional Lecture Method.

Table 4: Analysis of Covariance of Mean Achievement Scores of Students in the Experimental and Control Groups.

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	529.981[a]	2	264.990	22.972	.000	.205
Intercept	4612.054	1	4612.054	399.826	.000	.692
Pretest	3.532	1	3.532	.306	.581	.002
Method	527.254	1	527.254	45.708	.000	.204
Error	2053.257	178	11.535			
Total	86315.000	181				
Corrected Total	2583.238	180				

Results shown in Table 4 indicate that F-value of 45.708 for the methods is significant at 0.000. This is because, 0.000 is less than 0.05 significance level earlier set for the null hypothesis. Hence, the null hypothesis is rejected. This implies a significant difference in the mean academic achievement scores of SS2 Biology students taught Nutrition Concepts using Laboratory-Based Instruction and those taught the same concept using Conventional Lecture Method.

HO_2: There is no significant difference in the mean academic achievement scores of male and female SS2 Biology students taught Nutrition Concepts using Laboratory-Based Instruction.

Table 5: Analysis of Covariance of Mean Achievement Scores of Studentsin the Experimental Group across Gender.

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	11.060[a]	2	5.530	.378	.686	.009
Intercept	2549.355	1	2549.355	174.300	.000	.685
Expr Pretest	.521	1	.521	.036	.851	.000
Gender	10.487	1	10.487	.717	.400	.009
Error	1170.097	80	14.626			
Total	46479.000	83				
Corrected Total	1181.157	82				

Results in Table 4 show that F-value of 0.717 for gender is not significant at 0.400. This is because, 0.400 is greater than 0.05 significance level earlier set for the null hypothesis. Hence, the null hypothesis is retained. This implies that there is no significant difference in the mean academic achievement scores of male and female SS2 Biology students taught Nutrition Concepts using Laboratory-Based Instruction.

HO_3: There is no significant interaction effect of instructional strategy and gender on the mean academic achievement scores of SS2 Biology students in Nutrition Concepts.

Table 6: Analysis of Covariance for the Interaction Effect of Method and Gender on Mean Achievement Scores of Students in theExperimental and ControlGroups.

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	550.643[a]	4	137.661	11.920	.000	.213
Intercept	4613.671	1	4613.671	399.492	.000	.694
Pretest	3.553	1	3.553	.308	.580	.002
Method	497.257	1	497.257	43.057	.000	.197
Gender	.040	1	.040	.003	.953	.000
Method * Gender	20.640	1	20.640	1.787	.183	.010
Error	2032.595	176	11.549			
Total	86315.000	181				
Corrected Total	2583.238	180				

Results in Table 6 indicate that F-value of 1.787 is not significant at 0.183 for the interaction between Method and Gender. This is because, 0.183 is greater than 0.05 significance level earlier set for the null hypothesis. Hence, the null hypothesis is retained implying that there is no significant interaction effect between the teaching methods and gender of the subjects on their academic performance. This implies that students' achievement in Biology is not affected by students' gender and instructional strategy combined together.

Summary of the Findings

The major findings from the study are summarized as follows:

1. There is no statistically significant difference in the mean academic achievement scores of SS2 Biology students taught Nutrition Concepts using Laboratory-Based Instruction and those taught the same concept using Traditional Lecture Method.
2. There is no statistically significant difference in the mean academic achievement scores of male and female SS2 Biology students taught Nutrition Concepts using Laboratory-Based Instruction.
3. There is no statistically significant interaction effect of instructional strategy and gender on the mean academic achievement scores of SS2 Biology students in Nutrition Concepts.

Discussion

From Table 4, it is evident that students in the students in the experimental group had a significantly higher mean academic achievement scorecompared to their control group counterparts. This shows that the instructional strategy employed influences students' achievement in Biology, with the Laboratory-Based Instruction being more effective than Traditional Lecture Method in improving students' achievement in Nutrition Concepts. This may be attributed to the active involvement of students in practical activities which is inherent in Laboratory-Based Instruction. This result isin concordance with Khanet al. (2012), Ajayi and Osoko (2013), Oluwasegun et al. (2015), Alake (2015), Ng'ethe (2016), Mwangi (2016) and Usman and Lawal (2017) all of whom indicated that active participation of the students through Practicals and Laboratory-Based Instruction gave rise to more effective learning in science subjects like Basic Science, Biology, Chemistry and Physics.

In the case of gender, the findings from Table 5 revealed that male and female students do not differ significantly in their academic achievement when taught using Laboratory-Based Instruction. This may be attributable to the fact that students of both sexes, having been equally exposed, equally benefit from the hands-on and mind-on activities as inherent in Laboratory-Based Instruction. The result agrees with the findings of Ajayi and Osoko (2013), Ezenwosu and Nworgu (2013) and Lawal and Usman (2018) who revealed no significant difference exist in the academic achievement of male and female Biology students exposed to practical-oriented and activity-based strategies.

The findings from Table 6 also revealed that there is no significant interaction between instructional strategy and gender in respect of students' academic achievement in Biology. It implies that gender combined with instructional strategy do not significantly contribute to variance in students achievement in Biology. This result is in agreement with the findings of Ajayi and Osoko (2013) and Ezenwosu and Nworgu (2013) who showed from their findings that there is no statistically significant interaction effect between method and gender on students' performance in Biology.

Conclusion

Based on the findings of the study, the following conclusions are drawn:

(i) Laboratory-Based Instruction is an effective means to enhance the academic achievement of secondary school students in Biology.

(ii) Laboratory-Based Instruction effectively fosters academic achievement in Biology irrespective of gender among secondary school students.

(iii) Instructional strategy and gender combined do not significantly affect secondary school students' achievement in Biology.

Recommendations

Based on the findings of this study, the following recommendations are made:

(i) Biology teachers should help students learn difficult concepts in Biology like Nutrition more easily by employing the Laboratory-Based Instructional Strategy.

(ii) Professional bodies like the Science Teachers Association of Nigeria (STAN) should collaborate with the State Governments to organize more seminars, workshops and conferences on the effective utilization of Laboratory-Based Instruction for teaching Biology.

(iii) Federal and State Ministries of Education should provide adequate funds to sponsor Biology teachers nationwide for in-service trainingson Laboratory-Based Instructionas a measure towards improving teacher efficiency which translates to better students' academic achievement in difficult Biology concepts.

(iv) Federal and State Governments in collaboration with some Non-Governmental Organizations should provide public schools with standard and well-equipped Biology laboratories where teaching and learning can be undertaken using Laboratory-Based Instruction.

(v) Curriculum planners should ensure that curriculum implementation put into practice the use of Laboratory-Based Instruction.

(vi) School administrators should encourage Biology teachers to employ the Laboratory-Based Instruction as well as provide incentives for improvisation of lacking instructional materials.

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QUALITY EDUCATIONAL PLANNING AT SECONDARY SCHOOL LEVEL: THE CHALLENGES OF SCHOOL PRINCIPALS

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Abstract
Preparation for useful living within the society implies a sound cultural, scientific and technology education. The purpose of education however well defined, is not self-executing; means must be devised to attain this aim. Therefore, there is the need for careful quality planning by principals of the school, both at short term and long term in order to achieve the desire goal. This paper is written to highlight the task of the principals at secondary school level and the major constraints. The paper therefore made recommendations on the way forward which include among others the training and retraining of the teaching staff for effective and maintenance of equipment purchased for the school.

Introduction
The importance of education to national development of any nation cannot be overemphasized. The Federal Government of Nigeria has adopted education as an instrument of excellent for effecting national development (FRN, 2004). Education in Nigeria is an invaluable instrument of political, social, economic, scientific and technological development. Owolabi and Fabunmi (2000) said that education is yet the greatest power man has developed either for his continued progress or eventual destruction. This therefore implies that quality educational planning is the only potent instrument of social reconstruction. This reveals that a well-articulated educational planning at all levels will achieve the desired goals of laying solid foundation for both individual and national development.

Similarly, Ajayi (2003) opines that education helps the individual to develop the ability to recognize and work out satisfactory solutions to his own problems and assist in resolving the major problems facing the society. Also, Ijaduola (2008) sees education to be the bedrock upon which every country hinged the development of human capital for effective functioning of the society. It can be concluded from these definitions that the purpose or goals of education that are accepted in any country influenced greatly its development, and consequently, the destiny of the people. Accordingly, the importance of planning in the attainment of goals include the inculcation of national consciousness and unity, the inculcation of the right type of value attitudes for the survival of the individual and the Nigerian society and the acquisition of appropriate skills, abilities and competence both mental and physical as equipment for the individual to live and contribute to the development of his society.

Nigeria as a developing nation with ethnic and religious diversities is today faced with serious economic, social, political and religious problems and the need to minimize these problems calls for scientific, systematic and quality educational planning. There is need for proper educational planning especially at secondary schools level by the school principals. Planning is supposed to

help the administrator prepare for the future. It includes determining objectives for the organization, examining the environment and forecasting policies, procedures and plans to achieve the objectives in view of the changing environment (Adesina, 1981).

It is evident that the ideals of educational planning are yet to be properly injected in the school management by the school principals. This calls for conscious efforts to examine the challenges of the school managers (principals) in the area of quality educational planning at the secondary school level. Consequently, this paper is therefore geared towards addressing the following issues:

(i) To identify the significant role of the school principals in the overall planning of the school;
(ii) Major constraints in planning;
(iii) Implication for quality educational planning; and
(iv) Conclusion and recommendations

Meaning of Planning

The main concern of a plan is the future. It tries to predict the efforts of future events, therefore helping the organization to remove or reduce the limitations of the present to meet the future with relative confidence and success. Longe (2000) described planning as a process of establishing priorities for future actions in an attempt to solve economic problems, which stem from the existence of scarce resources. Also, Ogunu (2000) asserted that planning is deciding in advance of what to do, how to do it, when to do it and who is to do it. Ukeje (2000) sees planning as the identification of purpose and objectives and setting forth of the means of attaining them. Edem (2008) remarked that planning involves structuring the organization in such a way that the people involved perform various tasks to achieve common objectives. In addition, Fabunmi (2004) defined planning as the process of preparing a set of decisions for action in the future with the view of achieving goals, by optimal means.

It can therefore be deduced from the above that planning needs careful preparation so as to achieve the desired objectives, especially in determining the future of the individual. These definitions suggest that planning is very important and helps the school principals to remove or reduce the limitations of the resent in order to meet the future success.

Need for Quality Educational Planning

The rapid rate of change in the society calls for careful planning. Challenges in the educational environment can be political, sociological, economical or technological and for education to maintain equilibrium in the changing society, educational managers (principals) must anticipate the future and make quality planning ahead.

Thus, Ajayi (2003) described educational planning as a continuous process of obtaining and analyzing facts from an empirical base of providing information to decision makers on how well the education system is accomplishing its goals. Also, Fabunmi (2004) sees educational planning as a process of preparing a set of decisions on education in such a manner that the goals and objectives of education will be realized in the future, using the available resources judiciously. In addition, Edem (2008) defined educational planning as a continuous process of obtaining and analyzing facts and, from empirical base, of providing information for decision makers on how best the education system is to accomplish its goals and on how to achieve cost effectiveness of education programmes.

This reveals that educational planning is a systematic document of how best to utilize educational resources in such a way that the goals and purpose of education will be efficiently realized.

Education deals with human beings who cannot be manipulated like machines. They possess unique qualities, capabilities that makes them to be dynamic. Therefore, in order to get their cooperation, there is need for careful and quality planning. Careful and quality planning will reduce the limitations of the present and will bring future success.

Quality educational planning according to Fabunmi (2004) involves the following:
(i) Setting goals and objectives for educational systems;
(ii) Planning the manpower needs;
(iii) Financial planning, with a view of providing guidelines on how to make prudent use of available financial resources;
(iv) Planning the judicious utilization of available physical resources or facilities; and
(v) Preparation of alternative decisions.

Based on the analysis of the present state of educational planning, it has become pertinent to outline the following as the principal's task in quality educational planning:

The School Principal's Tasks

According to Ekundayo (2009), the following are the school principals tasks perform in their schools:
(i) Human Resources Management: These include recruitment of personnel, their training, compensation, induction and evaluation of their performance;
(ii) Material Resources Management: This involves the purchasing and distribution of materials, storage and control of such material and purchase of apparatus, books and other teaching materials;
(iii) School Discipline: This has to do with the disciplinary methods to be adopted for students and the teachers' discipline;
(iv) School Finance: These involve the fiscal setting of the school, government grants, school fees, school activities as a source of revenue and the school budget;
(v) School Management: The school principals also manages facilities such as sites construction and utilization of buildings repairs and maintenance of the facilities and the playground for games and sports.
(v) Welfare and Medical Services: It is also the responsibility of the school principal to see to the welfare and provide medical services to both the staff and students.

Planning for Curriculum Implementation

The task of the school principals as a planner is a complex task that requires the training, skill, experience and educational knowledge of the school principal in order to accomplish the goals of educational planning at the school level. As a professional leader, he has to plan the implementation of the school curriculum. Again, the size of the school will assist him in the implementation of the curriculum. In a big school, he has many teachers to control and to supervise. He has to see to the management of class teaching, the conduct of examinations and the assessment of students' performances. All these will no doubt pose greater challenges to the school principals in a big school than a small school.

Budget Planning at the Secondary Level

Budgeting at the secondary school level has a lot to do with the size of the school. The bigger the school, the more articulated the budget will be. The purpose of education no matter how inspiring cannot execute itself without the means of realizing this purpose. As Dada (2006) reports, one of the roles of the principal is the allocation of financial resources, distributing resources within the budget and auditing control. Therefore, the school principal must present a broad view of the educational programme to be embarked upon. This will show clearly the decision reached as regards the number and qualification of staff, population of the school, number of classrooms, the library and equipment needed by the school.

Budget whether big or small school should not be a one-man affair. The inputs from staff members must be sorted out and translated into financial terms according to needs and nature of the school.

Authors Position on Principal's Tasks

The authors purposively selected 30 principals from 30 secondary schools within Kaduna metropolis. A total of 20 private and 10 public secondary schools were selected. A proforma designed by the authors with 10 items were given to the principals. The proforma items required the principals to rate their opinions on principal's tasks of quality educational planning at the secondary school level as **major** or **minor**. The data were analyzed using simple percentage.

Table 1: Responses of the School Principals

S/N	Tasks	N	Opinion Major	%	N	Opinion Minor	%	Total %
1	Management of staff	25	Major	83	5	Minor	17	100
2	School discipline	26	Major	86	4	Minor	14	100
3	School finance	22	Major	73	8	Minor	27	100
4	Facilities Management	20	Major	67	10	Minor	33	100
5	Welfare and medical services	20	Major	67	10	Minor	33	100
6	Curriculum planning	18	Major	60	12	Minor	40	100
7	Sporting activities	20	Major	67	10	Minor	33	100
8	Hostel facilities	16	Major	53	14	Minor	47	100
9	Relationship with government officials/owners	25	Major	83	5	Minor	17	100
10	Management of students	26	Major	86	4	Minor	14	100

Source: Authors

The analysis of the data in Table 1 shows that the 10 items on the proforma were rated as the major tasks of the principals. The breakdown shows that management of students and school discipline were the most major tasks of the principals with 86%. Also, management of staff, relationship with government officials/owners and school finance were rated as the next major tasks of the principals with 83%, 83% and 73% respectively.

In addition, facilities management, welfare and medical services, curriculum planning and hostel facilities were rated as the least tasks performed by the principals with 67%, 67%, 60% and 53% respectively.

On the other hand, school discipline, management of students, management of staff and relationship with government officials/owners were rated the most minor tasks of the principals with 14%, 14%, 17% and 17% respectively. Also, school finance, facilities management, welfare and medical services and sporting facilities were the next most minor tasks of the principals with 27%, 33%, 33% and 33% respectively. In addition, curriculum planning, and hostel facilities were another minor tasks of the principals with 40% and 47% respectively.

Major Constraints of Educational Planning at Secondary School Level

The school principals has to manage both personnel and overcrowded curriculum which has so many subjects offered in the school, The subjects offered at the Junior Secondary School (JSS) are generalized leading to an integrated approach in pre-vocational content, while that of Senior Secondary School (SSS) are more specialized leading to specialization.

Another major constraint is coping with the high population of students for effective teaching and learning. Most educational equipment imported with no spare parts and specialist to handle them makes their use to be rendered useless. Most of the teachers cannot operate the equipment not to talk about the students. This has made teaching and learning to be difficult. This therefore, calls for the need for training of staff to operate and maintaining these equipment in order to effect the teaching of science and technical subjects in the school.

Also, there is constraint the school principals face at the beginning of the school calendar. He meets a new set of students and staff, he makes new plans and implement decisions made with his staff, these decisions may take the form of money, the content to be taught and methods to be adopted either at short or long term.

Implication for Quality Educational Planning

Onocha (2002) had defined quality as the level of excellence in performance on the strength of the quality of the context, inputs, process/transaction and output. To the authors, quality means effectiveness. Therefore, quality education means effectiveness education and one of the indicators is quality principals saddle with planning at the school level.

In order to ensure quality educational planning at the secondary school level, the principal should ensure that the teachers are fully involve in the process of quality planning. Also, quality educational planning will no doubt provides strengths and weaknesses which will translate into overall performance of the students and the school in general.

Azikiwe (2007) and Adepoju (2008) have revealed that adequate planning of educational planning will address inadequacies and planners (principals) can make conscious and strategic efforts towards overall performance of the school climate.

Conclusion and Recommendations

There is need for quality educational planning by the school principal in order for the school to achieve the desired goals. The school principal is then charged with the responsibility of implementing various school programmes and tasks for desired result both at short and long term.

However, the school principal and the staff are faced with various problems when planning at the school level and these problems might hinder success in planning. Therefore, the following recommendations are made for improvement:

(i) There is need to make available standard science and technical laboratories equipped with science and technical equipment for teaching and learning.
(ii) The sole responsibility of financing the schools should not be left to the government. Parent Teachers Association (PTA), Old Students Association and spirited individuals should contribute towards the effective budgeting of the school.
(iii) The school principal should not budget alone. It should be joint efforts of all members' staff of the school.
(iv) The school principal should see the need for training and retraining of the teaching staff not only for effective teaching but also to man the equipment purchase for school.
(v) The school principal should be given freehand to discipline erring teaching staff in order to ensure the effective execution of the school programmes and tasks.

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INFORMATION AND COMMUNICATION TECHNOLOGY EDUCATION: A MEANS OF ENHANCING QUALITY EDUCATION

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Abstract
Information and Communication Technology (ICT) has importantly changed the practices and processes of all forms of endeavor within business, governance, education, and other socially oriented activities. This study is carried out to provide an overview of the significance of ICT towards enhancing quality education in Nigeria. The study adopts an exploratory research approach. Based on the reviewed literature, this study finds out that effective use of ICT will enhance the quality of teaching and learning processes in Nigeria. It is therefore, recommended that institutions of learning should endeavor to provide required ICT facilities as it will motivate both teachers and students in their teaching and learning processes.

Introduction
Education is one of the most important needs for the well being of individual and that of the society. Thus, education is a powerful instrument of social, political, and economic progress, without which neither an individual nor a society can attain professional growth. Information and communication technology (ICT) is an indispensable part of the contemporary world. In fact, culture and society have to be adjusted to meet the challenges of the information age. Information and communication technology (ICT) is a force that has changed many aspects of people's ways of life. Considering such fields as medicine, tourism, travel, business, law, banking, engineering and architecture, the impact of ICT in the past two or three decades has been enormous. The way the fields operate today is vastly different from the way they operated in the past. But if one looks at education sector, there seems to have a little impact of ICT utilization and far less change, than other fields have experienced. However, a lot of people have attempted to explore this lack of activity and influence (Soloway and Pryor, 1996; Collins, 2002). The pervasive influence of ICT has brought about a rapid technological, social, political and economic transformation, which has paved way to net work society, organized around ICT. The field of education has not been unaffected by the penetrating influence of information and communication technology. However, ICT has immensely contributed to the quality and quantity of teaching and learning and research in traditional and distance education institutions. ICT enhances teaching and learning through its dynamic interactive and engaging content and provides real opportunities for individualization of instruction. Information and communication technology has the potential to accelerate, enrich and deepen skills, motivate and engage students learning, helps to relate school experience to work practice, helps to create economic viability for tomorrow's workers; contributes to the total development of the institution; strengthens teaching and learning and provides opportunities for connection between the school and the world (Davis and Tearle, 1999).

Kirschner and Weperies (2003) maintained that information and communication technology can make the school more efficient and productive, by organizing a variety of tools to enhance and facilitate teachers' professional activities. Yusuf and Onasanya (2004) opined that ICT provides opportunities for school to communicate with one another through e-mail, mailing list, chat room and other facilities. It provides quicker and easier access to more extensive and current information. ICT can also be used to do complex tasks as it provides researchers with a steady avenue for the dissemination of research reports and findings. Yusuf and Onasanya (2004) advanced three major reasons for information and communication technology in education. They, however, suggested that it is a tool for addressing challenges in teaching and learning situation; a change agent; and central force in economic competitiveness. As a tool for addressing challenges in teaching and learning, technology has the capabilities for delivery, management and support of effective teaching and learning. As a change agent, it is capable of changing the content, methods and overall quality and quantity of teaching and learning, thereby reducing teachers' workload and ensuring constructivist inquiry-oriented classroom. Moreover, ICT a central force in economic and social shifts that has technology skill critical to future employment of today's students. Davis and Tearle (1999) pointed out that the role of technology in teaching and learning is rapidly becoming one of the most important and widely discussed issues in contemporary education policy. Experts in the fields of education have agreed that, if ICT is properly used, it holds great promise to improve teaching and learning in addition to shaping work-force opportunities. Thus, this study is carried out to provide an overview of the significance of ICT towards enhancing quality education in Nigeria.

What is E- Teaching?

Simply defined, E- Teaching is an electronic teaching. It is technically the same thing as regular classroom teaching except that e-teaching is presented in an electronic media. Oluwafemi (2006) asserts that the internet has the potentials to bring about a profound change in education in all professions. Traditional approaches to teaching, lecturing and tutoring confined to classroom are now extended by modern approaches to teaching using the more recent technology of online classrooms, multimedia, courseware, distant course, online workshops, media education and video conferencing (Adako, 2006).

With the use of internet services, the traditional method of disseminating information on universities courses through leaflets and other print outs are becoming obsolete. The internet is offering a different approach by making the universities worldwide to promote and advertise their academic programmes to much wider domestic and international audience. It is a perfect channel for distance education programme. Courses can be offered on the internet and students supervised, tutored and consulted through the internet. Learning materials can be down loaded and instructional programme given via e-mail and continuous assessments are carried out. For the institutions of learning, the internet can be ideal place to store lecture notes, course materials and assignment sheets. However, this is a recent development in Nigerian educational system and many of the undergraduate teachers in Nigerian universities only make use of internet facilities to carry out assignments and other research works. Some institutions in Nigeria have embraced the online registration for courses and fee payment but no academic teaching has been carried out online for students not to talk of examinations through internet. However, the programme of the former University of Education, Ikere-Ekiti, Nigeria now consolidated with Ekiti State University, Ado- Ekiti, Nigeria, has been ICT driven where all students were given laptops and two weeks intensive training on ICT to facilitate e-teaching and learning process in the university. The development is very recent and challenging as the

university was committed to be a leader in teacher education in Africa. This could be a model for other teacher training institutions to emulate in Nigeria to develop teacher education to a globally acceptable standard.

ICT Enhancing Teaching and Learning Process

The field of education has been affected by ICTs, which have undoubtedly affected teaching, learning and research (Yusuf, 2005) .ICTs have the potential to accelerate, enrich, and deepen skills, to motivate and engage students, to help relate school experience to work practices, create economic viability for tomorrow's workers, as well as strengthening teaching and helping schools change (Davis and Tearle, 1999; Lemke and Coughlin, 1998; cited by Yusuf, 2005). In a rapidly changing world, basic education is essential for an individual to be able to access and apply information. Such ability must include ICTs in the global village.

Conventional teaching has emphasized content. For many years course have been written around textbooks. Teachers have taught through lectures and presentations interspersed with tutorials and learning activities designed to consolidate and rehearse the content. Contemporary settings are now favoring curricula that promote competency and performance. Curricula are starting to emphasize capabilities and to be concerned more with how the information will be used than with what the information is. Contemporary ICTs are able to provide strong support for all these requirements and there are now many outstanding examples of world class settings for competency and performance-based curricula that make sound use of the affordances of these technologies (Oliver, 2000). The integration of information and communication technologies can help revitalize teachers and students. This can help to improve and develop the quality of education by providing curricular support in difficult subject areas. To achieve these objectives, teachers need to be involved in collaborative projects and development of intervention change strategies, which would include teaching partnerships with ICT as a tool. According to Zhao and Cziko (2001) three conditions are necessary for teachers to introduce ICT into their classrooms: teachers should believe in the effectiveness of technology, teachers should believe that the use of technology will not cause any disturbances, and finally teachers should believe that they have control over technology. However, research studies show that most teachers do not make use of the potential of ICT to contribute to the quality of learning environments, although they value this potential quite significantly (Smeets, 2005). Harris (2002) concludes that the benefits of ICT will be gained "when confident teachers are willing to explore new opportunities for changing their classroom practices by using ICT. As a consequence, the use of ICT will not only enhance learning environments but also prepare next generation for future lives and careers (Wheeler, 2001). Changed pool of teachers will become changed responsibilities and skills set for future teaching involving high levels of ICT and the need for more facilitative than didactic teaching roles.

ICT Enhancing Learning Environment

ICT presents an entirely new learning environment for students, thus requiring a different skill set to be successful. Critical thinking, research, and evaluation skills are growing in importance as students have increasing volumes of information from a variety of sources to sort through (New Media Consortium, 2007).ICT is changing processes of teaching and learning by adding elements of vitality to learning environments including virtual environments for the purpose.ICT is a potentially powerful tool for offering educational opportunities. It is difficult and maybe even impossible to imagine future learning environments that are not supported, in one way or another, by Information and Communication Technologies (ICT).

When looking at the current widespread diffusion and use of ICT in modern societies, especially by the young, the so called digital generation then it should be clear that ICT will affect the complete learning process today and in the future. Authenticity is an important issue which should be addressed in the design and development of learning environments (Collins, 1996). Learning environments need to reflect the potential uses of knowledge that pupils are expected to master, in order to prevent the acquired knowledge from becoming inert (Bransford, Sherwood, Hasselbring, Kinzer and Williams 1990; Duffy and Cunningham, 1996). In addition, teachers should stimulate pupils to engage in active knowledge construction. This calls for open-ended learning environments instead of learning environments which focus on a mere transmission of facts (Hannafin, Hall, Land, and Hill, 1994; Jonassen, Peck, and Wilson, 1999, as cited in Collins, 1996). ICT may contribute to creating powerful learning environments in numerous ways.

ICT provides opportunities to access an abundance of information using multiple information resources and viewing information from multiple perspectives, thus fostering the authenticity of learning environments. ICT may also make complex processes easier to understand through simulations that, again, contribute to authentic learning environments. Thus, ICT may function as a facilitator of active learning and higher-order thinking (Alexander, 1999; Jonassen and Reeves, 1996).

Quality Education

Education is seen as a key for transformation of individual for National development. A nation is said to be valued when a sizeable number of the citizens have quality education. Quality education according to Kwacha (2007) includes:

(i) Learners who are healthy, well-nourished and ready to participate and learn and supported in learning by their families and communities;
(ii) Environments that are healthy, safe, protective and gender-sensitive, and provide adequate resources and facilities;
(iii) Content that is reflected in relevant curricula and materials for the acquisition of basic skills, especially in the areas of literacy, numeracy and skills for life, and knowledge in such areas as gender, health, nutrition, HIV/AIDS prevention and peace;
(iv) Processes through which trained teachers use child centered teaching approaches in well-managed classrooms and schools and skilful assessment to facilitate learning and reduce disparities.

Outcomes that encompass knowledge, skills and attitudes, and are linked to national goals for education and positive participation in society (UNICEF, 2000). In recent years there has been a groundswell of interest in how computers and the Internet can best be harnessed to improve the efficiency and effectiveness of education at all levels and in both formal and non-formal settings. If Nigeria as a nation needs to improve her quality in education the essentials of information and communication technology in her educational system needs urgent attention. Educational systems around the world are under increasing pressure to use the information and communication technologies (ICTs) (UNESCO, 2002 as cited by Yuen, Law and Wong (2003). Similarly, Nwosu and Ugbomo (2012) opined that, the field of education has certainly been affected by the penetrating influence of ICT worldwide and in particular developed countries. ICT has made an impact on the quality and quantity of teaching, learning and research in the tradition and/or distance education institutions using it (Kwacha, 2007). The need for re-orientating and re-engineering of its formal education patterns for transformation of its citizens

is vital. Nwosu and Ugbomo (2012) assert that, ICTs greatly facilitate the acquisition and absorption of knowledge, offering developing countries unprecedented opportunities to enhance educational systems, improve policy formulation and execution, and widen the range of opportunities for business and the poor. UNESCO (2003) points out that "this vision of education emphasizes a holistic, interdisciplinary approach to developing the knowledge and skills needed for a sustainable future as well as changes in values, behavior, and lifestyles. However, Plomp, Pelgrum and Law (2008) opined that, acquisition of information and communication technology skills include the ability to become lifelong learners within a context of collaborative inquiry and the ability to work and learn from experts and peers in a connected global community .

Benefits of ICT in Enhancing Quality Education

There are numerous benefits derived from the use of ICT tool in enhancing quality ICT education such as the ability for learner to choose when to learn irrespective of geographical location without stress. Secondly, ICT also enable learners to discover and explore new ideas or innovations from experts around the global world through the use of the common ICT available facilities. Thirdly, the existence of ICT into education system will enable delivery of lectures to students, monitoring of learner progress and assessment can be done timely. However, Nwosu and Ugbomo (2012) listed the following as the benefits derived from the use of ICT in education:

(i) Active learning: ICT-enhanced learning mobilizes tools for examination, calculation and analysis of information, thus providing a platform for student inquiry, analysis and construction of new information. Learners therefore learn as they do and, whenever appropriate, work on real-life problems in-depth, making learning less abstract and more relevant to the learner's life situation. In this way, and in contrast to memorization-based or rote learning, ICT enhanced learning and promotes increased learner engagement. ICT-enhanced learning is also "just-in-time" learning in which learners can choose what to learn when they need to learn it.

(ii) Collaborative learning: ICT-supported learning encourages interaction and cooperation among students, teachers, and experts regardless of where they are. Apart from modeling real-world interactions, ICT-supported learning provides learners the opportunity to work with people from different cultures, thereby helping to enhance learners' teaming and communicative skills as well as their global awareness. It models learning done throughout the learner's lifetime by expanding the learning space to include not just peers but also mentors and experts from different fields.

(iii) Creative Learning: ICT-supported learning, promotes the manipulation of existing information and the creation of real-world products rather than the regurgitation of received information.

(iv) Integrative learning: ICT-enhanced learning, promotes a thematic integrative approach to teaching and learning. This approach eliminates the artificial separation between the different disciplines and between theory and practice that characterizes the traditional classroom approach.

(v) Evaluative learning: ICT-enhanced learning is student-directed and diagnostic. Unlike static, text- or print-based educational technologies, ICT-enhanced learning recognizes that there are many different learning pathways and many different articulations of knowledge. ICTs allow learners to explore and discover rather than merely listen and remember.

Recommendations

In order to overcome the hindrances of ICT in quality education, the following recommendations should be put in consideration to ensure the effectiveness of ICT in quality education.

(i) The Federal Ministry of Education, Nigerian Universities Commission, National Board for Technical Education and National Commission for Colleges of Education should adopt ICT international standards and its inclusion in the Nigeria education system.

(ii) There should be Continuous efforts by government and schools to train and retrain teachers and other supporting staff on computers and ICT skill acquisition.

(iii) Government should develop and train ICT experts, specifically for instruction design and development, who will work in partnership with educators and teachers in order to enhance teaching and learning in the school.

(iv) The government should address seriously the issues of the erratic electricity power supply, since ICT equipment depends on electricity to function.

(v) Government at all levels of educational system should make ICT a matter of priority, improve the funds needed in ICT training of teachers, students and supporting staff.

(vi) Institutions of learning should endeavor to provide required ICT facilities as it will motivate both teachers and students in their teaching and learning processes.

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UNDERUTILIZATION OF LANGUAGE LABORATORY IN LANGUAGE LEARNING IN POST SECONDARY SCHOOLS IN GOMBE STATE, NIGERIA

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Abstract
This paper entitled, "Underutilization of Language Laboratory in Language Learning in Post Secondary Schools in Gombe State", is an opinion paper which attempts to explain how language laboratories are unavailable and where available are being underutilized by restricting its usage to only teaching foreign languages. The paper has been introduced by making some highlights on key concepts: Language, Language Laboratory, Language Acquisition and Language Learning. Basic functions of Language Laboratory have been highlighted. Lopsidedness of language Laboratory usage to only foreign languages to the detriment of our local languages has also been discussed. The paper opines that this has generated inferiority and superiority conflict between foreign languages and of course local languages. The language policy as stated in the National Policy on Education made provision for learning English language (foreign) as a medium of instruction in our schools as well as one or two languages of our immediate environment (local). Both languages in essence, require facilities to ease their learning. The method adopted in this paper is observation and the sources of data used are secondary sources from the library references. Some of the recommendations proffered by this paper include ensuring local language teachers are made to expose their learners to the phonetic and phonological processes involved in learning the languages of their environment. This is only possible if Language Laboratory is available and properly put to use.

Key words: Underutilization, Language, Language Laboratory, Language Learning, Foreign Language and Local Language

Introduction

One of the major concerns of Nigerian Linguists in the 21st century is gross underutilization of Language Laboratories across learning institutions in the country. A major pre-requisite of establishing any learning institution is availability and usage of related laboratories as clearly stated in the National Policy on Education. Section 8, Sub-sections 125 and 127 (FGN, 2013) state that:

8.125: Educational support services facilitate the implementation of educational policy, the attainment of policy goals and the promotion of effectiveness of educational system.

8.127: To achieve these goals, the following support services and facilities be provided. They include:
(i) School Library
(ii) Laboratories and workshops

(iii) IT hardware and software laboratories
(iv) Etc, etc.

According to Wikipedia, a laboratory is a facility that provides controlled conditions in which scientific or technological research, experiments, and measurement may be performed. It goes further to broadly say that, "broadly, is a place providing opportunity for experimentation, observation, or practice in a field of study". The classrooms of the 21st century should be entirely technology driven, and there is need to look at equipment, materials and funding that will propel this process (FGN, 2015). These 21st century technology driven classrooms, refer to the laboratories for the various disciplines. They include: Biology Laboratory, Chemistry Laboratory, Computer Laboratory, Language Laboratory, Physics Laboratory and Film Laboratory. Other forms of laboratory are Metal Workshop, Wood Workshop, Construction Workshop and many more. It is against this backdrop that examination and regulatory bodies like West African Examination Council (WAEC), National Examination Commission (NECO), National Business and Technical Education Board (NABTEB), National Board for Arabic And Islamic Studies (NBAIS), National Board for Technical Education (NBTE), National Colleges of Education Commission (NCCE), The *National Universities Commission* (*NUC*), to mention but a few, ensure that the various laboratories should be put in place at their respective educational levels before they are accorded accreditation to run the various programmes and examinations. One good thing about these regulatory bodies is that, the accreditation is not only at the commencement level of the institutions. It is a continuous routine to be carried out at defined intervals to maintain the set standards.

For language learning, which is the focus of this paper, Language Laboratory is very fundamental. Akindele and Adegbite (2005), rightly observe that two facilities that are important for language development in the educational process are the Library and Language Laboratory services. It should be noted that successful learning of a language, especially the oral-aural skills, depends on the availability of a good language laboratory equipped with tape-recorders and speech measuring instruments. In essence, the Library can be seen as another form of laboratory. Going by this therefore, Language Learning requires two basic laboratories: Language Laboratory and the Library. Despite the uniform treatment accorded to these various laboratories in learning the different disciplines by the National Policy on Education, the Language Laboratory has not been given the due attention especially at the tertiary institutions by the responsible regulatory bodies. It is discovered that other forms of laboratories for other disciplines to some extent are available and put into use. However, the reverse is the case with Language Laboratory. While a number of institutions may not be allowed to operate without laboratories like: Chemistry Laboratory, Biology Laboratory, etc, etc, the same are allowed to operate without Language Laboratory at all. This has there become a case for concern for the linguists which should be given the desired attention by educational stakeholders.

Conceptual Framework

Conceptual framework is defined as the way ideas are organized to achieve a research project's purpose (Shields & Rangarjan, 2013). They are abstract representations, connected to the research project's goal. It is in view of this that it is worthwhile to familiarize ourselves with some concepts closely related to the title of this paper. This will enable us have a better insight of what is being discussed in the paper.

Language: Language is a very complex human phenomenon; all attempts to define it have proved inadequate. That informs the several definitions from various Linguists. It is vehicle for the expression or exchanging of thoughts, concepts, knowledge, and information as well as the fixing and transmission of experience and knowledge (Hadumod, 1998). Encyclopaedia Britannica defines language as "a system of conventional, spoken or written symbols by means of which human beings, as members of a social group and participants in its culture, communicate". Cambridge International Dictionary of English,1995 defines language as a system of communication consisting of a set of small parts and a set of rules which decide the ways in which these parts can be combined to produce messages that have meaning. In his own submission, Sapir (1921) opines that "Language is a purely human and non-instinctive method of communicating ideas, emotions and desires by means of voluntarily produced symbols." A language [is] a set (finite or infinite) of sentences, each finite in length and constructed out of a finite set of elements" (Chomsky, 1957). Patanjali simply defined it as that human expression which is uttered out by speech Organs. The various definitions above can be summarized thus a human vocal noise or its representation used systematically and conventionally by a speech community for the purposes of communion (Jauro & Swa, 2016).

Language Laboratory: According to the Oxford Advanced Learners Dictionary, Language Laboratory is a room in a school or college that contains special equipments to help students learn foreign languages by listening to tapes, CDs, watching of videos or DVDs recording themselves etc. Traditionally, "Language Laboratory is a room equipped with audio and visual equipment, such as tape and video recorders, for learning a language" (Jauro & Swa, 2016). The *language laboratory* is an audio or audio-visual installation used as an aid in modern *language* teaching. They can be found, amongst other places, in schools, universities, and academics (Wikipedia). Basically, Language Laboratory is primarily found in the schools and other learning environments. Language laboratories according to David Wilson and Thayalan (2007) in (Joan & Mabel, 2016) provides a facility which allows students to listen to model pronunciations, repeat and record the sounds, listen to their performance and compare with the model and do self assessment. Language laboratory is an audio-visual installation used in modern teaching methods to learn the foreign languages (Deepika & Kalaiarasan). In view of this therefore, Language Laboratory justifies the true nature of communication which is a two-way process that allows for feedback.

Types of Language Laboratory: Mark Warschauer, (1998), has divided Language Laboratory into three segments. The first phase on development of lab is **Behaviouristic Lab**, the second phase as **Communicative Lab** and the last phase is classified as **Interactive Lab**. After a few years he renamed these three types as:

1. Structural Lab
2. Cognitive Lab and
3. Sociocognetive Lab

Language Acquisition: Language acquisition refers to a subconscious process whereby children develop ability in their first language as a result of natural and largely random exposure to language and 'language learning' which refers to conscious process whereby 'adult' develop ability in the second language through structured exposure in the classroom (Adegbite, 2009). This definition is limited because it fails to capture other category of language learners, like the language disorder, etc. However, a more accommodating definition of language acquisition is seen as an umbrella term, (according to Hadumod, 1998), that accommodates natural

acquisition of one's first language, natural acquisition of a second language or multiple languages, second language acquisition in a formal learning environment and relearning of one's language in therapy resulting from language disorder. This is to say that language acquisition is not restricted to a particular area of language-learning process or language learning group. It has been summarized as the process by which humans acquire the capacity to perceive, produce and use words to understand and communicate, which involves the picking up of diverse capacities including syntax, phonetics, and an extensive vocabulary (en.wikiversity.org*)*. Language acquisition, just like its main domicile domain i.e. communication, is a two way process: receptive language acquisition which is the ability of the child to understand language and expressive language acquisition on the other hand is the ability of the child to use language for communication.

Language learning: This requires more conscience than language acquisition because it involves the result of direct instruction in the rules of language. Language learning is not an age-appropriate activity for very young children as learning presupposes that learners have a conscious knowledge of the new language and can talk about that knowledge. They usually have a basic knowledge of the grammar. During early infancy, language processing – during acquisition – occurs in many areas of the brain. Only over time it gradually becomes concentrated into two areas:

Broca's area**:** This is situated in the left frontal cortex, it is involved in sequencing if language element for output and also related to speech (such as speaking and writing). Furthermore, it also involves in the production of the patterns in vocal and sign language. The broca's area is the one actively involved in language acquisition processes. Where an individual is having difficulty in speaking and writing he is considered as suffering from broca's aphasia.

Wernicke's area**:** It is situated in the left temporal cortex that is primarily involved in language comprehension, whereas the Wernicke's area is active in the language learning process (utesinternationallounge.com). Wernicke's aphasia is a disease of werncke's area or injury in the left temporal cortex which causes inability to comprehend spoken language.

Fundamentals of Language Laboratory

A little of its history will help in determining the role Language Laboratory in learning a language. The history of the language laboratory according to Parker (1961), Diekhoff (1965), and Hocking (1967), in (Abdelaziz, 2017), was first launched in 1957 and then in 1958 by the military organizations. Later (Léon, 1962; Peterson, 1974; & Saettler, 1990, p. 187) state that the first lab was established at the University of Grenoble in 1908. Delcolque, et al, (2000) adds that the first audio device welcomed is the phonograph, and have immediately adopted other advances in audio technology such as magnetic tape and digital media. The 1960s era was the golden period of the language laboratory that led to an explosion in the number of facilities (Abdelaziz, 2017). According to Hocking (1967), by 1962, there was a massive increase in the number of labs at the Secondary schools level since 1958. Within and after 1962, there were more than 900 labs in higher education (Hocking, 1967). Additionally, more post secondary labs were built from 1965 when matching funds became available (Ek, 1974, pp. 17-23). Although they did not cite a source for their information, Keck and Smith (1972, p. 5) claim that by mid-decade, an estimated 10,000 language laboratories had been installed in secondary schools and 4,000 more could be found in institutions of higher learning across the world". This development resulted into sudden involvement of teachers into a technological revolution,

suddenly chin-deep in a tide of new demands upon their competencies, and they seek, some almost frantically, enlightenment and practical help. In Nigeria, the adopting English language as a foreign language and as a medium of instruction among learning institutions informed the need to establish language laboratories across all levels of schools and of course subsequent pronouncement in the National Policy on Education.

The role of Language Laboratory to learning any language cannot be overemphasized. The language lab is a technological break for imparting skills in language learning. The following are of the relevance of language laboratory (Deepika & Kalaiarasan):

(i) **Auditory Oriented:** The direct sound transmission gives step by step guidance from the teacher to the heads of the students with crystal clear clarity.
(ii) **Better Attention:** The Lab software is more attention enthralling for the students, where they are engaged with individual systems.
(iii) **Comprehensive quickly:** The Lab increases the pace of comprehension as student coaching is purely based on the level of study.
(iv) **Damper the idea:** The Lab regulates the language through the different thoughts created in the mind of the students.
(v) **Effective learning:** The lab provides to learn the foreign language practice in a focused setting that eliminates the feelings of self-consciousness.
(vi) **Focus Veracity:** By using text, audio and video can easily be integrated with actuality in everyday situations.
(vii) **Guide the group:** It is easy to guide the groups by monitoring each student independently without disturbing the others students.

The students feel different when they learn in different atmosphere. Apart from the traditional classroom, lab creates an easy atmosphere. Language lab plays a pivotal role in learning the spoken English. The basic proficiency in spoken English and any other languages is imparted to students through the language lab.

Underutilization of the Language Laboratory

There are two levels at which underutilization of language laboratory can be viewed in Gombe state which is likely applicable elsewhere in Nigeria. They are establishment and utilization:

(i) Establishment: This is clearly observable across the existing post secondary schools in Gombe state. At present, there are ten existing and functional post secondary institutions. They include:

1. Gombe State University, Gombe
2. Federal University, Kashere.
3. Federal College of Education (Tech), Gombe.
4. Federal School of Horticulture, Dadin-Kowa.
5. Gombe State College of Education, Billiri.
6. College of Nursing and Midwifery, Gombe.
7. College of Legal and Islamic Studies, Nafada.
8. Gombe State Polytechnic, Bajoga.
9. Gombe State School of Health Technology, Kaltungo.
10. JIBWIS College of Education, Gombe.

Language, specifically English language, is expected to be taught either as a major course or/and as a general course in communication skills and as core and compulsory course (GFN, 2013). Out of all the above mentioned institutions, only Federal College of Education (Tech), Gombe and Federal University, Kashere can bust of only one Language Laboratory each to cater for their respective high population of students. This situation depicts clearly how Language Laboratory is grossly utilized. This is for the simple fact that out of ten post secondary schools, only two own one laboratory which represents only 20% and eight institutions without even a language laboratory representing 80%. The pre-requisites of establishing any post secondary institution, is the presence of laboratories of Language Laboratory is one of them. Language, in particular, English language (where necessary language of the immediate environment) is the medium of instruction (FGN, 2013).

(ii) Lopsided Usage of the Language Laboratory:

It is very unfortunate that institutions where a Language Laboratory is available cannot be open for other local languages to use. The general impression developed on the usage of the Language Laboratory is tilted closely to teaching English language or a foreign language to the detriment of other local languages. Every language has its own system which includes: Phonology, grammatical rules and structures, intonation patterns, orthography, etc, etc. In view of this therefore, the Language Laboratory is very key to the successful language usage and practice as confirmed by David Wilson and Thayalan (2007) in (Joan & Mabel, 2016) that "Language laboratory provides facility which allows students to listen to model pronunciations, repeat and record the sounds, listen to their performance and compare with the model and do self assessment", without a particular language in mind. This paper also opines that there is nothing bad after acquiring a language to have an opportunity to engage into exploring the phonological processes involved in the concerned language. The use of Language Laboratory should not be restricted to teaching of foreign languages alone (e. g. English Language). It is a known fact that languages across the world are learned almost the same way, because languages across the world share the same features. This fact has been affirmed by Miyagawa (2010) that "Every language shares the same set of grammatical features, and every language overtly manifests these features", which include: Morphological, Interface, Structural and derivational. The process of language acquisition depends on an innate language faculty called the innateness hypothesis. The innateness hypothesis, put forward by Chomsky, claims that the process of language acquisition is genetically predetermined by an innate language faculty (Cook, 1988). Universality in language is therefore found among all languages worldwide.

It is against this backdrop that at present, there exists, a superiority and inferiority conflict between foreign (e. g. English) languages and of course local languages resulting from this imbalanced impression. This is a costly impression to local languages as this narrows the chances of developing our local languages.

Conclusion

Regulatory and examination bodies of learning institutions should as a matter of importance and urgency ensure that prerequisites of establishing and running of learning institutions are adhered strictly. More so, all language teachers should be exposed to the Language Laboratory. Surely, language laboratories represent the single largest investment and installment of audio resources in education. By high merit of its unique equipment and its unambiguous pedagogy, it stands alone. The computer now fulfills all the need of language educators and gives life to language for many learners.

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EFFECT OF ICT UTILIZATION ON LIBRARIANS' PRODUCTIVITY IN ACADEMIC LIBRARIES IN NIGER STATE.

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Abstract
This is a survey research on the effects of ICT utilization on librarians' productivity in Academic libraries in Niger State using a survey of 6 academic libraries. The objective of this study is to determine the availability, application and usage of ICT in academic libraries in Niger state. It also reveals the user's perceptions on ICT competence of librarians and how productive they are.The study adopted a descriptive survey design with a study population of all librarians and users of the academic libraries in Niger state. A total enumeration method of sampling technique was adopted for the librarians, while a random sampling technique was adopted to select 50 users, specifically, the academic staff from each institution under study. The main instrument used for data collection is the questionnaire and the data gotten was analysed using tables of frequency distribution, percentages and bar charts. The findings revealed that there were various types of ICT facilities in use in academic libraries. It was also discovered that ICT was averagely applied in virtually all the library operations like acquisitions, circulation cataloguing and classification, etc. Also, majority of the users indicated that the level of ICT competence of librarians is average, although, few of them have high competence in carrying out their duties with the use of ICT. As beneficial as ICT application is to librarians, there are certain factors that hinder the positive impact of ICT on academic libraries in Niger State and they include; absence of automation policies and strategies to support and guide the use of ICTs, inadequate funding to sustain ICT infrastructure, poor network/internet connectivity, inadequate/erratic power supply and limited, expensive internet bandwidth, and failure to organize workshops and conferences to train and update the library staff. Consequently, all these problems should be addressed to enable the libraries meet the main objective for which they are established.

Keywords: ICT, Librarians, Productivity, University Libraries, Academic Staff, Niger State.

Introduction
The accelerated adoption and the application of Information and Communication Technologies (ICTs) in libraries all over the world have continued to have positive impact on the methodologies of library and Information service delivery of librarians. The Information and Communication Technologies (ICTs) have brought revolutionary changes in handling, delivering and storage of information. The use of Information and Communication Technologies (ICTs) by librarians has changed library and information services globally. Digital media has revolutionized the information society and advances in ICT have dramatically changed the information provisions. The internet has provided universal access to information. Technological innovation has changed the rate of conversion of knowledge, information and data into electronic format. Development in the software arena has generated powerful knowledge management software which has transformed the way knowledge is organized, stored, accessed and retrieved (Patra, 2008).

Academic libraries all over the world today fulfill a whole variety of services at a wide range of locations due to the technological advances which have enabled librarians to meet up to the educational needs of students, researchers, scholars and the leisure reading of the literate society. ICT has catapulted the world into an information-driven society that relies on ideas and information. ICT has engendered a new approach to work and service delivery, and is a technological development that has changed work and job expectations (Salisu, 2002). Academic Libraries in Nigeria began to use computers in the early 1980; little progress was however observed in the application of computers to Library services but between 1990 and 2000 there has been considerable progress. Today, there are several application software for library use and librarians and their co-staff have enjoyed numerous capacity building programmes and training. Information and Communications Technology has brought unprecedented change and transformation to academic libraries and information services.

The productivity of Librarians is largely dependent on his/her competence in the Digital Age to store, retrieve and disseminate information with the aid of information communication technology (ICT). This may be through computer, internet, E-mail, CD-ROM, slides, teaching aids, telephones, including the global system of mobile telecommunications (GSM), fax machines, etc. Implementing information and communication technology (ICT) in the library depends largely on the availability and utilization of ICT facilities and the attitude and competencies of librarians toward it. The application of ICT in academic libraries has caused significant changes in libraries such as: automated cataloguing, circulation, information retrieval, electronic document delivery (EDD), selective dissemination of information (SDI) and CD-ROM databases (Adekunle, Omoba & Tella, 2007). Very recently, there have been fast and significant changes in librarianship, where digital and electronic libraries complement, and in some cases replace, traditional libraries. Such IT development trend include mobile computing, social networking (web 2.0), web of data (web 3.0), cloud computing and storage, pervasive computing, etc.

Statement of the Problem

Library personnel are supposed to effectively use ICT so as to ensure optimum productivity. Unfortunately, optimum productivity of librarians tends to be a problem as Adeya (2001) observed that there are constraints against the development of ICT in Africa such as inadequate computerisation, inadequate infrastructure and inadequate human capacity, most of which relate to the economic disadvantage of these countries. The issue of skill acquisition and competence in the use of ICT is significant for the librarians to be productive.

Librarians must acquire competence to be relevant in their profession, in which nearly all roles and responsibilities are performed with the use of computers. Various research studies have pointed out inadequacies of coverage of the ICT component and the lack of ICT skills among library professionals. Librarians in many libraries in Nigeria still carry out library routines and functions manually, and the few computers in most libraries are used for administrative duties by confidential secretaries. The study explores the effect of ICT competencies on the productivity of librarians in Academic libraries in Niger State, their challenges and how these issues can be better addressed in order to establish effective information and communication technology usage in libraries and academic libraries in particular. It also explores the users' perception regarding the use of the library. Akintunde (2006) opined that ICT and (hence globalization) are irreversible global trends that have great benefits for academic purposes and so all efforts must be made to embrace them by Nigerian academic libraries.

Objectives of the Study

This study investigates the effect of ICT utilization on productivity of librarians in selected academic libraries in Niger State using three (3) academic libraries as case study. The specific objectives are to:

(i) Find out the availability and use of ICT facilities in libraries under study.
(ii) Find out the effects of ICT application on library resources and services.
(iii) Determine the constraints to the use of ICTs.
(iv) Find out the level of ICT competence of the librarians.
(v) Find out the users' perception on librarians' productivity.

Research Questions

The following research questions were developed to guide this study:

(i) What types of ICT facilities are available and in use in libraries under study?
(ii) What are the effects of ICT application on library resources and services?
(iii) What are the constraints to the use of ICTs?
(iv) What are the users' perceptions on librarians' competence and productivity?

Significance of the Study

The study examines the availability of technical support for ICT facilities in the library. It investigates the level of competence of librarians, their ability to deal with day-to-day ICT-related problems and the perception of the users on librarians' productivity. The study is significant in the sense that the findings will help to improve the librarians' manpower expertise by examining ways to create awareness and staff capacity building to meet up with the ICT challenges in their library. Also, the findings will also be used to establish a systematic standard for the adoption and utilization of ICT facilities in any academic library considering the fact that the study is based on six academic libraries in Niger State.

The study will be an addition to the existing literatures in the field of ICT application in library services.

Literature Review

Asnafi (2005) define ICT as the technologies that help us record, store, process, retrieve, transfer, and receive information. IT and ICT are dependent on each other. IT may refer to the machine and ICT to its products (Asnafi 2005). Information Technology (IT) is an omnibus term that combines computer and telecommunications technology; hence it is sometimes called Information and Communications Technology (ICT). It is concerned with the technology used in handling, acquiring, processing, storing and disseminating information. The convergence of computers and telecommunications in handling and processing information constitutes what is now known as Information and Communications Technology (Aina, 2004).

The World Bank defines ICTs as "the set of activities which is facilitated by electronic means the processing, transmission and display of information" (Rodriguez and Wilson, 2000). ESCAP (2000) refers ICTs to technologies people use to share, distribute, gather information and to communicate through computers and computer networks. Marcelle (2000) described ICT as a complex varied set of goods, applications and services used for producing, distributing, processing, transforming information- (including) telecoms, TV and radio broadcasting, hardware and software, computer services and electronic media.

According to Harrod's Librarians' Glossary and Reference Book (2010), a library is a collection of books and other literary material kept for reading, study and consultation. Reitz (2004) defines

a library as a collection or group of collections of books and/or other materials organized and maintained for use (reading, consultation, study, research, e.t.c.). Institutional libraries, organized to facilitate access by a specific clientele, are staffed by librarians and other personnel trained to provide services to meet user needs. By extension, the room, building, or facility the houses such a collection, usually but not necessarily built for that purpose. Libraries are broadly categorized into different types based on the target audience. Each category could be further divided into specific types. Aina (2004) listed the major types of libraries as follows; Academic Libraries, School Libraries, National Libraries, Special Libraries, Public Libraries.

Academic Libraries are libraries that are attached to post-secondary institutions (Aina, 2004). Oyedum (2015) defines academic libraries as those libraries that are mainly found in tertiary institutions, they are established to support learning, teaching and research processes. Aina (2004) stated that academic libraries are varied and distinctive as the institutions which they serve. He further stated that Academic institutions can be categorized mainly into two, namely: university and non-university institutions such as polytechnics, technikons, colleges of education, schools of nursing, etc. Based on this distinction, academic libraries can be broadly divided into two. These are university libraries and college libraries (libraries attached to non-university institutions).

To fulfil their mission of supporting the educational objectives of their parent bodies, Ifijeh (2010) highlighted the functions of university libraries as follows:

(i) Selection and acquisition of learning resources (both print and non print)
(ii) Organization of acquired resources (cataloguing and classification)
(iii) Reference and information services
(iv) Documentation and bibliographical services
(v) User education programs, including Readers' advisory service
(vi) Orientation courses and lectures
(vii) Research support
(viii) Consultancy service
(ix) Administration and management

The main function of College Libraries is to serve to the fullest extent possible the programmes of the college and implement its educational objectives (Aina, 2004).

Tella, Owolabi & Attama (2009) stated the main function of an academic library is to serve as an auxiliary to a parent institution in carrying out its objectives. The library is an important intellectual resource of the academic community, and helps them to fulfill the curriculum requirements and to promote studies and research (Rajendran and Rathinasabapathy, 2005). They maintained that the role of academic libraries should, among others, broaden the catalogue of resources in support of academic inquiry and discovery. The present-day academic library services in the 21st century is focusing more on the area of digital, virtual or libraries without borders all of which have transformed academic libraries and led to transition and transformation in the academic library environment (Abubakar, 2011).

Today, the contemporary practice in academic library services in the 21st century is being propelled with an information explosion, and the inclusion of Information and Communication Technologies (ICTs) in all aspects of library services. Kumar (2009) notes that academic libraries are changing dramatically by adopting new means of technology in all activities of print to e-environment where a variety of manual method, are replaced by computerized system which provides opportunity for online accessibility. The explosion of information and

communication technology (ICT) since the beginning of the 20th century has been rendering manual-based library system in academic, research, special and public libraries less relevant (Eguavoen, 2011). Everyday new technological advances affect the way information is handled in libraries and information centers (Krubu, 2011).

Rana (2009) cited by Krubu (2011) opines that ICT holds the key to the success of modernizing information services. Applications of ICT are numerous but mainly it is used in converting the existing paper-print records in the entire process of storage, retrieval and dissemination. Looking into the future of computerizing of library services in Nigeria, Ani (2007) cited by Adeniji (2011) reported that, it is hopeful that majority of University libraries in Nigeria (Africa) would have effectively computerized their library services by 2020 for the provision of efficient library services. ICT presents an opportunity to provide value-added information services and access to a wide variety of digital based information resources to their users. ICT can be used in libraries and information centers for the development of new information services and computerization of library services (Satpathy, 2011). She further highlights that ICT is useful for:

(i) Improving productivity and efficiency of library services effectively.
(ii) Provision of quality information.
(iii) Saving the space using the electronic storage.
(iv) Improving of cooperation in sharing of resource. (Satpathy, 2011).

Library Automation is one of the major applications of ICT. It involves the automation of major library activities such as circulation, acquisition, serial control, cataloguing etc. Library Automation has many advantages in that it reduces the number of repetitive routine tasks, it is more efficient than manual services, it generates library statistics easily, and more importantly, it speeds up library services (Aina, 2004). Reitz (2004) defined library automation as the design and implementation of ever more sophisticated computer systems to accomplish tasks originally done by hand in libraries.

Okiy (2005) points out poor and inadequate telecommunication facilities; poor level of computer literacy, even within the academic community; poor level of computer facilities; poor level of awareness of Internet facilities among policy makers, government officials and the ruling class in general; and minimum involvement of academic institutions in network building in Africa as challenges militating against the use of ICTs. Agboola (2000) cited Alabi (1987) who stated that individual efforts at library automation such as the one by the University of Lagos, University of Ibadan and the Ahmadu Bello University, Zaria in the mid 1970s and 1980s failed largely because of lack of technical know – how relating to software development and maintenance of hardware.

Nassarawa (2004) stated the major barriers to the implementation of ICTs at the Kano State Library as inadequate funding for manpower development; inadequate ICT infrastructure; erratic power supply and the prohibitive cost of running generators; and the absence of resources in digital form, as well as the non-existence of electronic libraries in the country.Owoeye (2011) noted that the use of ICT in developing countries has been hindered by many problems which include; insufficient fund allocation, inadequate manpower requirement, power outages, prohibitive cost of importation of hardware, software and the accessories of ICT, conservatism on the part of management and unfavorable government policies. Others include; lukewarm attitude towards alleviating the sufferings of academic institutions by the government, lack of training culture in ICT skills, inadequate infrastructures such as personal computers and communication facilities.

ICT has changed the ways and patterns in which information and other services are dispensed. Nwachukwu (2004) supports this by observing that with all the changes in information and the processes of access, storage, transmission, and reproduction, and librarians and libraries must adapt to new roles and skills to cope with change. Competencies are the knowledge, skills, and experience necessary to effectively handle professional responsibilities, usually within a specialization, expressed inclusive rather than as a set of minimum standards (Reitz, 2004).

Shibanda (2001) holds that the information managers, especially academic librarians, must build on the positive aspects of information era while alleviating the negative aspects of globalization. Supporting that view, Edekor (2004) contends that the effective management of new technologies depends largely on the availability of skilled employees and the society's level of literacy. Garuba (2007) support this view when he holds that the changing role requires that librarians learn new ways of performing their duties. He adds that computer literacy is of paramount importance to library professionals not only in Nigeria but other developing countries.

Phillips (1990) defines the concept of productivity as the relationship between quantities of output and quantities of input. The following formulae are recommended for library applications:

$$\text{Productivity} = \frac{\text{Output}}{\text{Input}}$$

OR

$$\text{Productivity} = \frac{\text{Results Achieved}}{(\text{Labor})\text{Resources Consumed}}$$

Watts (1986) identified the following applications of productivity information:

(i) Provide an indicator of departmental performance.
(ii) Identify variances from standard and target.
(iii) Compare performance with peer groups.
(iv) Predict staffing needs based on projected activity levels.
(v) Assess the impact of capital investment decisions.
(vi) Evaluate alternative courses of action.

Abubakar (2011) stated that for Nigerian academic libraries to provide the desired information services to their respective communities, that will match the requirements of the 21st century, emphasis should shift towards:

(i) Academic libraries should explore more alternative sources of funding as over reliance on the government on monies that are not forthcoming may not provide the desired solutions.
(ii) New initiatives are required in the form of consultancy services, marketing of information products as well as other income generating services.
(iii) The need for the committees of university librarians, and their counterparts in polytechnics and colleges to sensitize their respective institution's administrators on the central role of academic libraries in teaching, learning and research activities in academic communities.
(iv) More emphasis should be placed on the provision of online access and services such as OPAC, e-journals, e-books, and networked information services.
(v) Improvement in ICTs such as the Internet, Intranet, hardware and software as well as Internet band with.

(vi) The need for the Nigerian Library Association to be proactive in the 21st century.
(vii) Improvement in ICT training for academic librarians.

Methodology

The research design for the study is the survey type i.e. the survey research design was adopted for the study. The target population of the study consists of librarians and registered academic staff in academic libraries in Niger State. The sampling technique adopted for the purpose of this study is the stratified sampling technique involving six academic libraries; two institutions each from the three senatorial zones in Niger State. They include Ibrahim Badamasi Babangida University, Lapai and Federal Polytechnic, Bida in Niger South (Zone A) senatorial district; Federal University of Technology, Minna and Niger State College of Education, Minna in Niger East (Zone B) senatorial district; Niger State Polytechnic, Zungeru and Federal College of Education, Kontagora in Niger North (Zone C) senatorial district. The sampled respondents were drawn from the entire population of librarians while simple random sampling technique was used to select fifty (50) academic staff each from the selected institutions.

The questionnaire is the main instrument used for the collection of data for this study. This questionnaire was named Effect of ICT Utilization on the Productivity of Librarians in Academic Libraries (EICTUPLAL) Questionnaire. Two sets of questionnaire were administered; one for the librarians and the other for the registered academic staff. The questionnaires were administered on the respondents personally by the researcher. The structured interview method was also employed by the researcher to complement the data collected through the questionnaire.

Descriptive statistics involving tables, percentages and charts were used in analyzing the data collected and also to show the questionnaire response rate.

Data Analysis and Results

Research question 1: What types of ICT facilities are available and in use in libraries under study?

Table 1 Type of ICT facilities available and in use

ICT FACILITIES	AVAILABLE	IN USE	VERY ADEQUATE	ADEQUATE	INADEQUATE
Computers	33 (10.41%)	33 (13.69%)	10 (26.32%)	20 (12.99%)	3 (2.61%)
Library Management Software (e.g. ALICE, VTLS, etc)	23 (7.26%)	13 (5.39%)	3 (7.89%)	4 (2.60%)	16 (13.91%)
Scanners	28 (8.83%)	23 (9.54%)	2 (5.26%)	14 (9.09%)	10 (8.70%)
Barcode scanner/reader	15 (4.73%)	8 (3.32%)	-	4 (2.60%)	10 (8.70%)
Telephones	16 (5.05%)	11 (4.56%)	-	8 (5.19%)	5 (4.35%)
CD–ROM databases	22 (6.94%)	15 (6.22%)	-	12 (7.79%)	9 (7.83%)
Internet	29 (9.15%)	25 (10.37%)	5 (13.16%)	18 (11.69%)	6 (5.22%)
Multimedia projector	25 (7.89%)	21 (8.72%)	2 (5.26%)	13 (8.44%)	10 (8.70%)
Printers	32 (10.09%)	32 (13.28%)	12 (31.58%)	17 (11.04%)	3 (2.61%)

Photocopiers	30 (9.46%)	25 (10.37%)	-	21 (13.64%)	8 (6.96%)
Online Public Access Catalogue (OPAC)	21 (6.62%)	13 (5.39%)	1 (2.63%)	8 (5.19%)	13 (11.30%)
Local Area Network (LAN)	28 (8.83%)	18 (7.47%)	2 (5.26%)	14 (9.09%)	9 (7.83%)
Facsimile (fax) machine	15 (4.73%)	4 (1.66%)	1 (2.63%)	1 (0.65%)	13 (11.30%)
Total	**317 (100.00%)**	**241 (100.00%)**	**38 (100.00%)**	**154 (100.00%)**	**115 (100.00%)**

The result of the survey revealed that there were different types ICT facilities available and in use by the librarians across the six (6) academic libraries. However, Table 8 above reveals not only the availability and usage of ICT facilities in the libraries but also the respondents' indication on how adequate the ICT facilities are. The Table shows that computers are available and in use with a response rate of 33(10.41%), 10(26.32%) response rate for very adequate, 20(12.99%) response rate for adequate, and while 3(2.61%) response rate for inadequate. Also, 32(10.09%) response rate that printers are available, 32(13.28%) response rate for in use, out of which, 12(31.58%), 17(11.04%) and 3(2.61%) response rate for very adequate, adequate and inadequate. This is closely followed by 30(9.46%) response rate for the availability of photocopiers, 29(9.15%) response rate for the availability of internet services, 28(8.83%) response rate for the availability of Local Area Network (LAN) and scanners. 25(7.89%) response rate for the availability of projectors; 23(7.26%) response rate for the availability of library management software; and CD - ROM databases represents 22(6.94%) response rate; 21(6.62%) response rate for the availability of OPAC, while the availability of barcode scanner/reader and facsimile machine are very low with 15(4.73%) response rate each. This is confirmed by Rana (2009) who cited Krubu (2011) who opined that ICT holds the key to the success of modernizing information services.

Table 2 Library functions/services performed with ICT

S/N	Library functions/services	Frequency	Percentage (%)
A	Reference services	17	13
B	Online/literature searching	16	12
C	Word processing	15	11
D	Library databases	17	13
E	Cataloguing	15	11
F	Inter-library loans	5	4
G	Circulation	9	7
H	Serials management	12	9
I	Acquisitions	14	10
J	Selective Dissemination of Information (SDI)	13	9
K	Others (please specify)	1	1
	Total	**134**	**100.00**

The analysis in table 2 shows that the majority of the respondents, 17 with response rate 13%, use ICT for reference services and for library databases. This is closely followed by 16 respondents with response rate 12% who indicated the use of ICT for Online/literature searching, 15(11%) respondents use ICT for word processing and cataloguing. This is followed by 14(10%) respondents who use ICT for acquisitions. 13(9%), 12(9%), 9(7%), 5(4%) and 1(1%) response rates for the indication that ICT facilities were used for Selective Dissemination of Information, Serials management, Circulation, Inter – library loans and others respectively.

From the analysis in Table 2 above, it is revealed that although library activities are performed with the use of ICTs, the application is low (below average). It was also specified that ICT facilities are used for Indexing and abstracting services. When asked the level of ICT application in the library, 27(79.41%) of the respondents indicated that it is partially applied, 6(17.65%) respondents indicated that it is fully applied, and no respondent indicated that it is not applied at all.

Table 3. Level of ICT Application

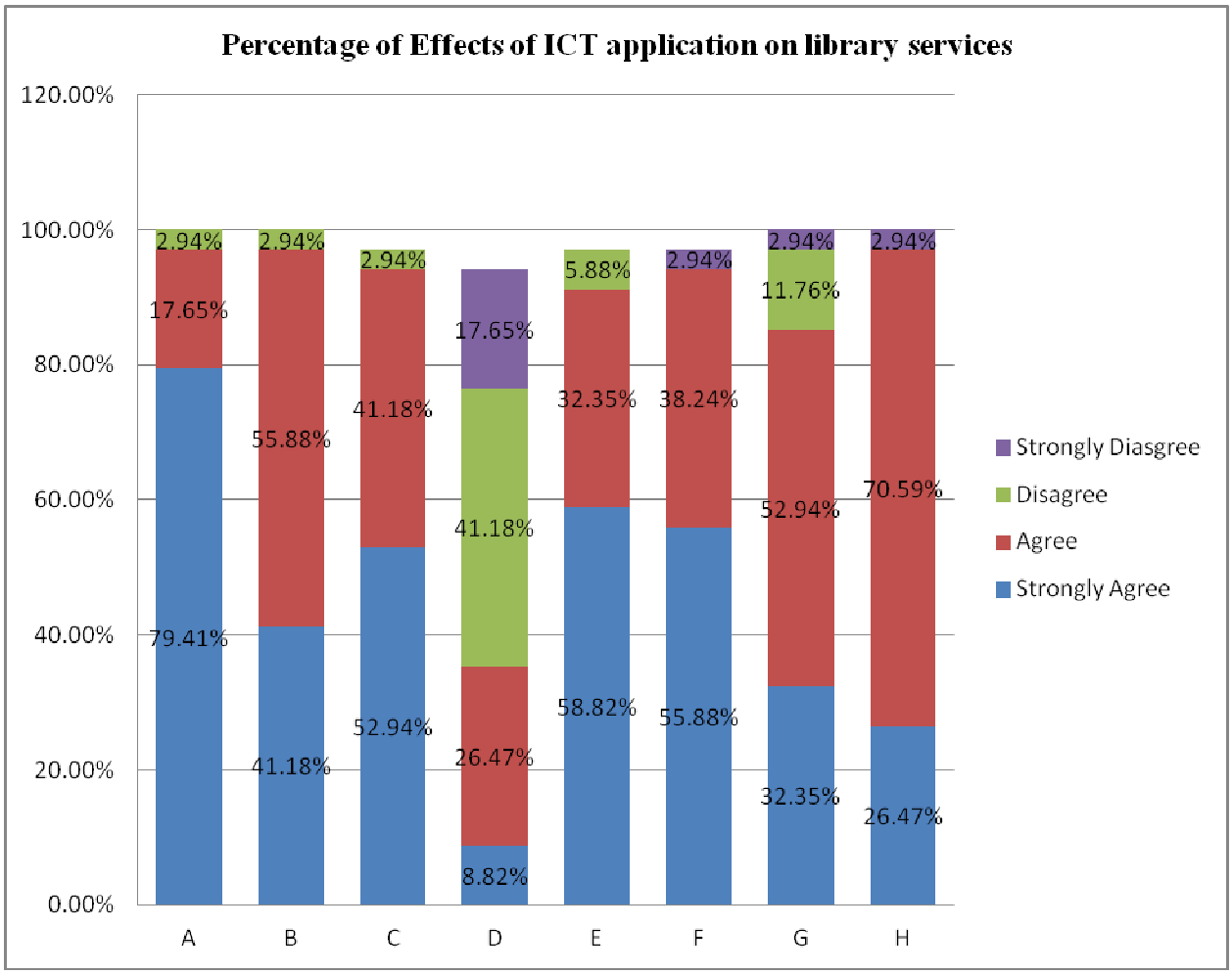
S/N	Library Activities	Level of ICT application			
		Full	**Average**	**Low**	**Never**
1	Collection development	6(10.91%)	16(16.67%)	4(10.00%)	6(13.95%)
2	Circulation services	5(9.09%)	15(15.63%)	6(15.00%)	4(9.30%)
3	Reference services	7(12.73%)	15(15.63%)	5(12.50%)	3(6.98%)
4	Serials management	7(12.73%)	13(13.54%)	4(10.00%)	5(11.63%)
5	Cataloguing and classification	8(14.55%)	7(7.29%)	7(17.50%)	5(11.63%)
6	Library public catalogue	7(12.73%)	8(8.33%)	5(12.50%)	7(16.28%)
7	General library management	12(21.82%)	11(11.46%)	4(10.00%)	4(9.30%)
8	Retrospective conversion exercise	3(5.45%)	11(11.46%)	5(12.50%)	9(20.93%)
	Overall Total	**55(100.00%)**	**96(100.00%)**	**40(100.00%)**	**43(100.00%)**

From the Table 3 above, total response rate of respondents who indicated full application of ICT to library activities is 55(100.00%). Its breakdown is as follows; collection development, 10.91%; circulation services, 9.09%; reference services, 12.73%; serials management, 12.73%; cataloguing and classification, 14.55%; library public catalogue, 12.73%; general library management, 21.82%; and retrospective conversion exercise, 5.45%.While the total response rate of respondents who indicated average application of ICT to library activities is 96(100.00%). Its breakdown is as follows; collection development, 16.67%; circulation services, 15.63%; reference services, 15.63%; serials management, 13.54%; cataloguing and classification, 7.29%; library public catalogue, 8.33%; general library management, 11.46%; and retrospective conversion exercise, 11.46%.

Also, the total response rate of respondents who indicated low application of ICT to library activities is 40(100.00%). Its breakdown is as follows; collection development, 10.00%; circulation services, 15.00%; reference services, 12.50%; serials management, 10.00%; cataloguing and classification, 17.50%; library public catalogue, 12.50%; general library management, 10.00%; and retrospective conversion exercise 12.50%.Finally, the total response rate of respondents who indicated never application of ICT to library activities is 43(100.00%).

Its breakdown is as follows; collection development, 13.95%; circulation services, 9.30%; reference services, 6.98%; serials management, 11.63%; cataloguing and classification, 11.63%; library public catalogue, 16.28%; general library management, 9.30%; and retrospective conversion exercise 20.93%.

***Research question 2*: What are the effects of ICT application on library resources and services?**



The analysis indicates that there are more positive effects of ICT on library services than there are disadvantages.Satpathy(2011) further highlights that ICT is useful improving productivity and efficiency of library services effectively, provision of quality information, saving the space using the electronic storage and improving of cooperation in sharing of resource.

Research question 3: What are the constraints to the use of ICTs in academic libraries?

The objective of the question is to determine the constraints to the application and utilization of ICTs in academic libraries in Niger state.

Table 4: Constraints to the use of ICT by library personnel

S/N	CONSTRAINTS	RESPONSE	PERCENTAGE (%)
a	Inadequate funding to sustain ICT infrastructure	29	11
b	Poor network/internet connectivity	30	12
c	Inadequate/erratic power supply	30	12
d	Limited and expensive internet bandwidth	18	7
e	Absence of automation policies and strategies to support and guide the use of ICTs	21	8
f	Lack of adequate knowledge and skills to manage digital information resources	26	10
g	Inadequate manpower with appropriate skills to manage ICT	22	9
h	Inadequate ICT facilities in the library	23	9
i	Inadequate technological infrastructures to support the integration of ICT in the library services	27	10
j	Failure to organize workshops and conferences to train and update the library staff	29	11
k	Others	2	1
	Total	**257**	**100.00**

From the Table 4 above, it is revealed that academic libraries encounter a lot of constraints in the application and utilization of ICTs. The response rate of the respondents are analyzed thus; Poor network/internet connectivity, 30(12%); Inadequate/erratic power supply with, 30(12%); Inadequate funding to sustain ICT infrastructure, 29(11%); Failure to organize workshops and conferences to train and update the library staff, 29(1%); Inadequate technological infrastructures to support the integration of ICT in the library services, 27(10%); Lack of adequate knowledge and skills to manage digital information resources, 26(10%); Inadequate ICT facilities in the library, 23(9%); Inadequate manpower with appropriate skills to manage ICT, 22(9%); Absence of automation policies and strategies to support and guide the use of ICTs 21(8%); and Limited and expensive internet bandwidth, 18(7%). 2 of the respondents with 1% response rate specified other constraints as lack of maintenance culture in the area of ICT facilities and low technological know-how of the librarians.

All these identified problems will no doubt serve as great impediments to effective use and application of ICT facilities in carrying out library duties. However, these problems should be addressed to enable the libraries meet the main objective for which they are established.This is affirmed by Owoeye (2011) and Omolayole (2002) when they noted that the use of ICT in developing countries has been hindered by many problems which include; insufficient fund allocation, inadequate manpower requirement, power outages, prohibitive cost of importation of hardware, software and the accessories of ICT, conservatism on the part of management and unfavourable government policies. Omolayole (2002) points out three strong reasons that stand against the effective use of ICTs in Nigerian academic libraries. Each of the factors she has mentioned has a resultant effect on availability and use of ICT. The factors are: low level of computer culture: poor telecommunications infrastructure; and general lack of awareness. These constraints, if not urgently addressed, will no doubt hinder the libraries to benefit from technological applications in information service delivery.

Research question 4: **What are the users' perceptions on librarians' competence and productivity?**

The objective of this question is to find out the user's perception of librarians productivity through the level of their ICT competence in carrying out certain library duties. Respondents (library users) where asked to rate the level of ICT competence of the library personnel in performing the following duties. When asked how frequently they use the library, 71(29.10%) respondents indicated daily; followed by 66(27.05%) respondents who indicated weekly; 43(17.62%) respondents indicated monthly, while 32(13.12%) respondents indicated fortnightly and others each. When which ICT tools do they make use of in their library, 155(63.52%) respondents indicated that they make use of library databases, 153(62.70%) respondents indicated that they make use of the internet, while 80(32.79%) respondents indicated that they make use of Online Public Access Catalogue (OPAC) and 43(17.62%) respondents indicated that they make use of CD – ROM technology.

Table 5: Level of ICT competence of academic librarians in Niger State.

S/N	DUTIES	HC	AC	LC	NC
A	Use of search engines	71 (9.10%)	98 (8.64%)	46 (5.32%)	21 (8.05%)
B	Use of Online/literature searching	69 (8.85%)	94 (8.29%)	56 (6.47%)	15 (5.75%)
C	Searching Library databases	101 (12.95%)	86 (7.58%)	37 (4.28%)	10 (3.83%)
D	Internet and networking skills	62 (7.95%)	90 (7.94%)	66 (7.63%)	17 (6.51%)
E	Electronic mailing and messaging	64 (8.21%)	75 (6.61%)	69 (7.98%)	26 (9.96%)
F	Navigating, browsing and filtering the internet	53 (6.79%)	78 (6.88%)	80 (9.25%)	20 (7.66%)
G	Identifying bibliographic formats (MARC, Virtua, etc)	59 (7.56%)	79 (6.97%)	76 (8.79%)	18 (6.90%)
H	Digitization of local content	30 (3.85%)	95 (8.38%)	79 (9.13%)	28 (10.73%)
I	Selective Dissemination of Information (SDI)	44 (5.64%)	97 (8.55%)	69 (7.98%)	22 (8.43%)
J	Answering reference query	84 (10.77%)	83 (7.32%)	57 (6.59%)	12 (4.60%)
K	Digital/Online reference services	47 (6.03%)	88 (7.76%)	74 (8.55%)	24 (9.20%)
L	Classification of digital documents	38 (4.87%)	85 (7.50%)	88 (10.17%)	24 (9.20%)
M	Searching CD – ROM databases	58 (7.43%)	86 (7.58%)	68 (7.86%)	24 (9.20 %)
	Overall Total	**780(100.00%)**	**1134(100.00%)**	**865(100.00%)**	**261(100.00%)**

The Table 5 above revealed that the responses from the library users of their perspective on librarian's competencies on the use of ICT. The highest response rate, 1134(100.00%),

revealed that the competencies of the librarians in carrying out their duties with the use of ICT is on the average level. This is followed by 865(100.00%) response rate, who indicated that the librarians level of competence is low. 780(100.00%) responded that the librarian's competence is high, while 261(100.00%) response rate indicated that they have no competence at all to carry out their duties. The representation of Table 6 is shown in Figure 4 below. Although the ICT competence of the librarians differs in each institution.

Table 6 Level of ICT Competence of Librarians in each Institution

Institution	HC	AC	LC	NC
Federal University of Technology, Minna.	234 (30.00%)	213 (18.78%)	97 (11.21%)	29 (11.11%)
Ibrahim Badamasi Babangida University, Lapai	187 (23.97%)	225 (19.84%)	119(13.76%)	15 (5.75%)
Federal College of Education, Kontagora	134 (17.18%)	125 (11.02%)	103(11.91%)	67 (25.67%)
Niger State College of Education, Minna	62 (7.95%)	197 (17.37%)	210(24.28%)	57 (21.84%)
Federal Polytechnic, Bida	90 (11.54%)	243 (21.43%)	149(17.23%)	44 (16.86%)
Niger State polytechnic, Zungeru	73 (9.36%)	131 (11.55%)	187(21.62%)	49 (18.77%)
Overall Total	**780(100.00%)**	**1134(100.00%)**	**865(100.00%)**	**261(100.00%)**

The analysis on Table 6 revealed that not all the librarians are ICT literate to help them carry out their duties with the use of ICT. Shibanda (2001) holds that the information managers, especially academic librarians, must build on the positive aspects of information era while alleviating the negative aspects of globalization. For the librarians to be productive, they must be able to offer user-friendly ICT-oriented facilities to meet the users' (academic staff) needs.

Conclusion

The availability of ICT facilities in libraries must be adequately utilized to ensure full and effective application in the library. It should be noted that it is not only the availability of ICT facilities in academic libraries that matters most but also the full application, integration and harmonization of these technological infrastructures in all library activities in order to ensure effective information service delivery in the library. It is apparent that the application of ICT in the library has numerous significant effects among which include, faster dissemination of information, promotion of resource sharing, and increment of library work output of librarians among others. The positive effects of ICT application in the library are greater than its negative effect. Therefore the various benefits of ICT utilization should be explored by librarians.

A number of constraints such as inadequate manpower with appropriate skills to manage ICT, lack of funds to sustain ICT infrastructure and lack of adequate knowledge and skills to manage digital information resources and irregular power supply which serve as impediments to the application of ICT in the libraries have been outlined.

Recommendations

Arising from the findings and conclusion are the following recommendations:

(i) The Academic Libraries in the six (6) institutions in Niger State should give priority to the development of ICT facilities in the libraries by ensuring their availability, usability, adequacy and accessibility by librarians and users of the library. Also, great emphasis should be placed on the automation of library activities. This can be done by generating automation policies and strictly abiding by them.

(ii) Efforts should be made to improve upon the quality of services rendered to library users by providing electronic services like the internet, online databases, CD-ROM databases and Online Public Access Catalogue (OPAC).

(iii) Constraints to the application and utilization of ICTs should be addressed. Effective and efficient power supply supplemented with standby generators should be provided to check the menace of erratic power supply; a substantial amount of the library's total budget should be devoted to technological development and the maintenance of equipment and infrastructure; periodic staff development programmes should be organized to address the dearth of unskilled staff to manage digital information resources; the library's internet bandwidth should be improved.

(iv) Re-skilling of librarians so as to improve their ICT competency and make them more productive in information service delivery to their users. Orientation programs on the use of ICT for information retrieval should be conducted and made compulsory for new entrants into the profession. Also, library user should be made aware of the available ICT – oriented retrieval systems in the library.

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IMPACT OF IDEAL PROBLEM SOLVING ON SELF-EFFICACY AND PERFORMANCE IN CHEMISTRY AMONG SECONDARY SCHOOL STUDENTS, KATSINA METROPOLIS, NIGERIA.

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Abstract
The study investigated the impact of IDEAL Problem Solving on self-efficacy and Performance in Chemistry Concept as a tool for enhancing critical thinking for Quality Education among Secondary School Students, Katsina Metropolis, Nigeria. Two Objectives, research question and null hypotheses were generated to guide the study. The design of the study was a quasi-experimental pretest-posttest-control-group design, involving one experimental group and one control group. The experimental group was exposed to IDEAL Problem Solving Model while the control group was taught using Lecture Method. A sample size of 83 SS 1 Chemistry students selected from two secondary schools in Katsina Metropolis were used as the study sample drawn from population of 753 students out of 10 schools. The instruments used for the study was a twenty five-item multiple choice Chemistry Performance Test (CPT) and Chemistry Self-efficacy scale (CSS) which was validated by experts and used for data collection. Mean, standard deviation, t-test and ANCOVA was used for data analysis. The result showed that; Students exposed to IDEAL Problem Solving Model performed significantly better in the Chemistry Performance Test (CPT) than those taught with lecture method. Also the IDEAL Problem Solving Model significantly enhanced Chemistry students' self-efficacy. Based on these findings, conclusion was drawn and the educational and economic implications were extensively discussed. Among the recommendations made was that IDEAL Problem Solving Model if effectively utilized and applied by teachers in the instructional delivery in chemistry and other science subjects could significantly improve the self-efficacy and performance of students which in turn enhances inclusive and quality education. Since the strategy encourages critical thinking, problem solving skills, motivation and performance, as chemistry plays an important role in the economic.

Keywords: Quality Education, Critical Thinking, IDEAL Problem Solving, Self-efficacy and Academic Performance.

Introduction

Quality education is one that provides all learners with capabilities they require to become economically productive, develop sustainable livelihoods, contribute to peaceful and democratic societies and enhance individual well-being. The learning outcomes that are required vary according to context but at the end of the basic education cycle must include threshold levels of literacy and numeracy, basic scientific knowledge and life skills including awareness. Quality Education requires children's active participation.Capacity development to improve the quality of teachers and other education stakeholders should be crucial throughout this process.Quality of education is determined by the development of total personality of the students. Education should aim at supporting the development of independent thinkers who are discerning problem solvers. Any discussion of quality education usually concentrates on some issues such as student level of achievement, relevance for life after school, and conditions of learning (teachers, facilities and instructional material). In inclusive viewpoint, quality education today has been defined from several perspectives: access, equity, equality, full participation, inclusion,

integration and empowerment. Satisfaction replaced excellence to denote quality since the beginning of 21st century. Similarly, diversity management has found a way into the arena of quality education today. Being responsive to diversities and sensitive to the principles of inclusion, quality education has become an overriding concern of stakeholders (Kafle, 2010). In order to maintain quality in education, it is necessary that there is quality in content and methods of teaching, management of educational process, what the students learn, and how to adapt education to changing needs through innovation (Ranjit, 2004).Based on observation, Pedagogy has been seen as a major issue. Teachers need to place greater emphasis on important knowledge and affective skills. The current reform provides space for teaching to emphasize on the application of knowledge, analysis, synthesis and evaluation besides recall and simple understanding. It also opens to opportunities for activities and learning experiences where learners develop personal and social skills and attitudes as they interact by sharing, discussing, acting responsibly, using different forms of communication and accepting diversity that promotes critical thinking. School-based learning, by contrast, often is slow and linear in its approach. Yet educators can positively impact this scenario by infusing their work with the learners with the skills and strategies that constitute real world problem-solving. Such skills are in the realm of critical thinking and creative problem solving. Critical thinking is an important area in the process of problem solving. Taken together, they comprise the most powerful approaches we can employ to educate the learners for the future lives they will live as citizens in a global society. These two skills has a tremendous impact on what students learn about subject matter, how they learn it, and how they feel about what they have learned.

Critical thinking is a recent educational paradigm for quality education. The development of a society and education depends on the creativity and critical thinking of the people and students. The rationale of specifically teaching critical thinking in any discipline is to improve the thinking skills of students and thus better prepare them to succeed in the world. Critical thinking involves the intentional application of rational, higher order thinking skills, such as analysis, synthesis, problem recognition and problem solving, inference, and evaluation" (Angelo, 2005).Critical thinking is needed to define the problem, to evaluate assumptions, opinions, and facts. Also make decisions and to choose the best ideas to solve a problem. Problem solving needs creative thinking to generate options and possibilities that can be transformed combined and explored in order to expand the number of possible solutions.The skill of problem solving is acquiring the knowledge that will lead one to a solution, and one's ability to combine that knowledge in a ready-to-use format and utilize it to find a solution (Altun. (2003). Problem solving is the highest level of learning in the hierarchy anticipated by Gagne (1970) which depends on the master of next lower type of learning. Problem situation occurs when they can adopt some useful strategies for effective problem solving. Bransford and Stein (1984) advocated five steps that are basically associated with the task of problem solving. These are (i) identifying the problem, (ii) defining and representing the problem, (iii) exploring possible strategies, (iv) acting on the strategies, and (v) looking back and evaluating the effect of one's activities referred to as IDEAL learning strategy. It is used to assist students in metacognitive processes especially in improving thinking ability and problem solving.

According to Nickerson in Phillipson and Lam (2011), states that "IDEAL refers to the steps that lead to problem solving and creativity, including identifying the problem, defining and representing the problem, exploring possible strategies, acting on the strategies and looking back and evaluating, "whereas according to Chidsey and Bickford (2016), states that" IDEAL define a problem as the difference between what is expected and what happened. The problem is not inherent to single person, but that a problem exists and needs to be addressed "From the above concepts it can be concluded that the IDEAL strategy is a step that leads to problem

solving and creativity, including identifying problems, defining and representing problems, exploring possible strategies, working on strategy and looking back and evaluating. IDEAL is designed to help identify and understand the different parts of a problem solving, each letter representing an important component in the process of completion: (a) identify problems; (b) define the problem; (c) explore alternate intervention; (d) apply the selected intervention; and (e) look at the effects. As with other learning strategies, IDEAL problem solving model also have advantages, according to Elias and Colleagues in Wehmeyer (2007): a) to increase awareness of problem and to introduce the idea of problem solving, b) to encourage positive expectations for problem solving and divert attention from negative or preoccupying thoughts, c) to encourage persistence against emotional stress and difficult situation, d) to facilitate a positive emotional state. This study employed the IDEAL problem solving model to enhance students' self-efficacy and performance which in turn will promote quality education.

Self-efficacy is an individual's characteristic (a self-construct) which enables a person to have a positive or realistic view of themselves or situations that they are in (Sieler, 1998). Self-efficacy is a belief that one is competent to handle the task at hand. It refers to a person's expectation of his or her ability to achieve a goal in a given situation and is a very influential factor in ensuring a person's potential is realized (Stevens, 2005). In other words, a person with a high self-efficacy has a realistic view of themselves and their capability which makes them persistence in their endeavors. Students who have higher levels of self-efficacy (more confidence in their ability to achieve their goals) are more likely to engage in metacognition and in turn, are more likely to perform at higher levels. Learning in a science classroom requires students to be self-regulated and this trait goes hand in hand with self-efficacy, metacognition and good achievement.

The importance of Chemistry is in line with the goals of secondary education in Nigeria which emphasized useful living within the society (FRN, 2013). Due to its abstract nature, there have been persistence decline in the achievement of students. Some of the reasons for this under-achievement according to Jegade and Fatoke (2014) include; poor capital investment in terms of provision of science resources, teachers' persistent use of traditional teaching methods which are ineffective in science pedagogy, Perceived difficult nature of topics in Chemistry by students, Poor computational skills, inability to apply learned concept, principles, formulae, units and lack of procedural guide or problem-solving skills (Bellow, 2005). In view of this, it is thereby important for science educators (Chemistry educator) to employ teaching strategy that will enhance critical thinking in learner by boasting their self-confidence and making them problem solvers for quality education. Based for this, this study investigated the impact of IDEAL problem-solving model as a tool for enhancing critical thinking for quality education on students' academic performance and self-efficacy in Concept of Chemistry.

Statement of the Problem

In spite of the important position of chemistry, there has been consistent decline in the performance of students in public examinations conducted by the West African Examination Council (WAEC) and National Examination Council (NECO) in Sciences across the country over the years (Samba & Eriba, 2012). But the most recurring factor for the low performance of students in is the inefficient teaching strategy employed by secondary school teachers, which is the conventional teaching strategy; lecture method (Jegede, 2009). According to Abah (2006), for effective teaching to occur, the teacher should get the learners involved as much as possible in activities that will enable them to develop the needed process skills and attitudes relevant to scientific life. Chemistry educators should understand the importance and advantage of problem solving ability as the prediction of achievement in the school environment. Students, having

problem solving ability, have the ability to acquire knowledge of wide applicability, and the development of the same ability to transfer that skill, acquired through problem solving in schools, to find solutions for their personal and community problems. Gupta, Pooja&Kavita (2015) concluded that problem solving ability of the students help them in building strong cognitive ability, which should be in a better position to reap the benefits of high academic achievement, enrolled in reliable future career choice, job availability and quality education. Once the Problem solving ability is acquired by the student, the elimination of error and putting correct discrimination for the practical work is achieved. Problem solving ability brings out the individual differences among the students for inclusion education. Increasing the ability of problem solving is a key factor of the learning content. Students find abstract nature of Chemistry difficult to learn, this is believed to be associated with their cognitive development such as reasoning and problem solving ability. Problem-solving Chemistry learning might improve the performance of students. In spite of efforts by educational researchers to improve school achievement especially in Chemistry, less attention has been paid to the affective component of the learning using problem solving such as students' perceived self- assessment which is the extent students possess the self-assessment skills relevant for Chemistry problem solving. Under the light of aforementioned information, the objective of the present study aimed at investigating the effects of problem-solving on self-Efficacy and performance as it enhances critical thinking for quality education among Secondary School Chemistry Students in Katsina Metropolis.

Research Questions

Two Research Questions were raised to achieve these objectives;

(i) What is the difference in the mean Academic Performance scores of Chemistry Students when exposed to IDEAL problem-solving method and those taught with Lecture Method.

(ii) What is the difference in the mean self-efficacy scores of Chemistry Students when exposed to IDEAL problem-solving method and those taught with Lecture Method.

Hypotheses

The following null hypothesis was formulated to be tested at $p \leq 0.05$.

HO_1: There is no significant difference in the mean performance scores of Chemistry students exposed to IDEAL Learning model and those taught with Lecture method.

HO_2: There is no significant difference between the mean scores of Chemistry Students' self-efficacy towards Chemistry when exposed to IDEAL Learning model and those taught with lecture method.

Methodology

The design of this study was a quasi-experimental design involving pre-test, post-test, with one experimental group and one control group. The population of this study comprised all the Public Senior Secondary one Chemistry students (SS 1) in Katsina Metropolis of Katsina state, Nigeria (Single sex and co-educational schools); the age range of the students is between 12-14 years old and intact classes were used. The use of SS 1 chemistry students was because it is a foundational stage for science and need to be treated with uppermost interest as it forms the base for their problem solving skill in SS 2 and SS 3. According to Katsina Zonal Educational Board (2017), there are total of 753 students offering chemistry in the zone. In choosing the sample schools, simple random sampling technique was employed to select four science schools from the population. Pre-test was conducted to determine homogeneity of the sample based on their ability level. It also ensures that the groups are equivalent on all important dimensions and that there are no systematic differences between the two groups. Two schools with close academic performance equivalence of 8.62 and 8.72 respectively were selected as the sample

of this study. The selected schools were grouped into experimental schools and control respectively using random sampling technique by balloting. Experimental group was treated using IDEAL learning Model while the control group was taught using the lecture method. A sample size of 83 students was used for the study; 41 for the experimental group and 42 for the control group. The instrument for data collection was the Chemistry Self-Efficacy Scale (CSS) and Chemistry Performance Test (CPT). The instrument was validated by experts and pilot tested. The reliability coefficient of the CPT was determined using test-retest method within an interval of two weeks. And that of the CSS was done using Cronbach alpha procedure. Pearson Product Moment Correlation (PPMc) was used to determine the reliability respectively and was found to be 0.74 and 0.77. The treatment lasted for four weeks after which the study subjects were post-tested. The Pre-test and Post-test data obtained were collated and analyzed, the hypotheses were tested using t-test statistic and Analysis of Covariance (ANCOVA).

Results

HO_1: There is no significant difference between the mean performance scores of Chemistry students when exposed to IDEAL Learning Model and those taught with lecture method. The result of t-test analysis is as shown in Table 1.

Table 1: T-test Analysis of Mean Academic Performance Scores of Experimental and Control Groups.

Variable	N	Mean	SD	SE	Df	t-value	p-value	R
Experimental	41	16.11	3.14	0.36				
					81	5.04	0.001	S
Control	42	12.87	2.61	0.29				

*Significant at P ≤ 0.05

From Table 1, it is evident that the calculated p-value of 0.001 is less than 0.05 level of significant. This implies that exposure to IDEAL Learning model significantly enhanced the academic performance of the students in the experimental group compared to their courter-part in the control group. Therefore, the null hypothesis of no significant difference is thereby rejected.

HO_2: There is no significant difference between the mean scores of Chemistry Students' self-efficacy in Chemistry when exposed to IDEAL Learning Model and those taught with lecture method. The result of ANCOVA is shown in Table 2.

Table 2: Analysis Covariance (ANCOVA) on Posttest Chemistry Students' Self-Efficacy

Source	Type III sum of squares	Df	Mean square	F	Sig.
Correct Model	48605.201	4	12151.328	235.229	0.001
Intercept	51705.326	1	51705.326	1002.528	0.001
Pretest	7932.371	1	7932.371	153.731	0.001
Experimental	46553.557	1	46553.557	903.436	0.001*
Gender	27.206	1	27.206	0.533	0.469**
Experiment x Gender	73.232	1	73.232	1.419	0.235**
Error	9848.788	76	51.598		
Total	710250.320	81			
Corrected Total	58253.101	80			

*Significant at P ≤ 0.05

Results on Table 2 reveal that treatment produced a significant effect on the students' Chemistry self-efficacy. This is indicated by the calculated f-value of 902.436 which is significant

at 0.001 and also significant at 0.05 levels. This implies that instruction in IDEAL learning Model significantly enhanced the Chemistry students' self-efficacy. Consequently, the null hypothesis of no significant difference in Chemistry students' self-efficacy of those in the treatment and control group is rejected**.**

Discussion

The findings of this study from Table 1 and Table 2, revealed that the IDEAL Learning problem solving Model has significant effects on performance and Self-efficacy of students in chemistry which in turn enhances their problem solving ability for inclusive and quality education. The findings of this study are in line with Adesoji, (2008) who investigated the impact of problem-solving instructional strategy on the performances of students of different ability levels in Chemistry. He concluded that the need for good instructional strategy like problem-solving technique was advocated for teachers of science, especially Chemistry due to its abstract nature. This would go a long way in improving problem-solving skills of students no matter their ability level. The findings are also supported by Sunday (2010) who found out that students who shy away from problem solving will likely be less productive because they may have the ability but since it has not been developed (to think and reason) they lack to know how to operate in that field. Uchenna and Sunday (2011) concluded that problem solving abilities and students' learning styles have significant effects on the student's achievement. Since Chemistry involves a lot of problem solving and these strategies will help students to possess the problem solving skills. Srimadevi and Saraladevi (2016) also identified that decision making and self-efficacy has an impact on problem solving ability thereby enhancing critical thinking and problem solving skills. Singaravelu (2017) affirmed that Teacher should give practice on problems of a huge variety to develop creative thinking in his students to increase the problem solving ability.

Conclusion and Recommendation

Students involved in this study had a higher self-efficacy and performance after being taught using the IDEAL problem solving learning model compared to those taught using conventional approach (lecture method). This is because the IDEAL problem solving learning model involves step that leads to problem solving and creativity which are; Identifying the problem, Defining and representing the problem, Exploring possible strategies, Acting on the strategies and Looking back and evaluating. Which in turn empower the learner to take charge of his/her own learning in a highly meaningful fashion which is a good tool for inclusive and quality education in Nigeria and beyond.

Based on the findings and conclusion, it is recommended that IDEAL Problem solving model; it is imperative that chemistry teachers should adopt these strategies to enhance students performance in Chemistry. If effectively utilized and applied by teachers in the instructional delivery in Chemistry could significantly improve the performance and self-Efficacy of students. Students should be exposed to IDEAL Problem solving model to enable them work independently of the teacher among their various learning groups or individually to minimize the situation of poor performance and lack of self efficacy in Chemistry due to its application in our everyday life. As stated earlier, for trans- modern society, towards which we are heading, a society based mostly on cooperation, not on competition, requires a new approach of investments in human capital and a re- spiriting of the said item from an integrating perspective. This goal can be achieved only through education using learning strategy which promotes critical thinking which bring about correlation between the education quality, the economic performances (economic growth) and the institutional environment. This strategy can also be employed in an inclusive classroom due to its features. Critical thinking is beneficial,

as it can help students to better in schools and colleges by improving their understanding. It helps people succeed in their career by improving their ability to solve the problems, think creatively and communicate their ideas clearly and effectively.

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AVAILABILITY AND UTILISATION OF ELECTRONIC RESOURCES AND SERVICES BY LIBRARIANS IN UNIVERSITY LIBRARIES IN NASARAWA STATE, NIGERIA

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Abstract
This study surveyed the availability and utilisation of electronic resources and services by librarians in university libraries in Nasarawa State, Nigeria. The study reported that electronic resources and services constitute a major source of information for librarians in their job/research productivity. Availability of electronic resources and services denotes the assurance that electronic resources and services are acquired, processed and managed by libraries in order to facilitate their accessibility and utilisation, while utilisation entails the practical and deliberate effort to maximize the use of library electronic resources and services. The research design adopted for the study is descriptive survey and the population is 36 librarians from Bingham University, AutaBalifi, Federal University, Lafia and Nasarawa State University, Keffi. A structured questionnaire, observation checklist and interview schedule were used to collect relevant data regarding the study. The study revealed that various electronic resources and services are available across the three universities in Nasarawa State, Nigeria, except Online Public Access Catalogue (OPAC), multimedia services, electronic reference services, electronic Selective Dissemination of Information (SDI) and electronic document delivery services that behaved differently. Furthermore, there were variances in the utilisation and satisfaction rate with the use of electronic resources and services by librarians in the three university libraries under study. Where the utilisation/satisfaction is low, it was attributed to epileptic power supply, low bandwidth/ network fluctuation, lack of renewal /updates to subscription of online databases among others. The literature review showed that the job/research productivity of librarians depends on the level of availability and utilisation of electronic resources at their disposal, it was recommended that deliberate efforts by the university management should be made to ensure adequate funding of the university libraries in order to acquire and make electronic resources and services abundantly available in university libraries in Nasarawa State.

Keywords: Availability and Utilisation; Electronic Resources and Services; Librarians, University Libraries; Nasarawa State, Nigeria.

Introduction
The primary objectives of establishing a university is to promote scholarship, research and development in various fields of learning and community services, as stated in the national policy on education. One of the goals of university education is to acquire both physical and intellectual skills which will enable individuals to become self-reliant and useful members of the society (Eze and Uzoigwe, 2013). Behind the mission and vision of the university education is

the university library, which is the academic library serving the university community. A university library is generally regarded as the heart of the university. It is the hub of all academic activities in a university. The main functions of universities include: conservation of knowledge, pursuit, promotion and dissemination of knowledge through teaching, research and development of human resources for meeting the manpower needs of the nation. In order to carry out these responsibilities efficiently and effectively, universities worldwide establish libraries to complement and supplement their functions, aims and objectives. The primary purpose of the university libraries is to support teaching, learning, and research in ways consistent with, and supportive of, the institution's mission and goals (Emenike, Obiora and Chibuzor, 2014).

University libraries play a prominent role in supporting the mission and vision of the university by providing information resources and services in various forms to librarians, faculty members, students and researchers. Moreover, the librarians discharging these services to the library clienteles need to be trained and equipped with relevant skills to deliver effective and efficient services. A librarian is an information professional who has undergone a degree course in library science (librarianship). He or she is saddled with the responsibility of managing the library and its collections, selection and acquisition of book and non-book or electronic materials, and other services such as Current Awareness Services (CAS), Selective Dissemination of Information (SDI), loan or Document Delivery Services (DDS), to meet the information needs of the library clientele. Nowadays, the quantity of electronic information resources are overwhelming, therefore, librarians must possess media literacy skills commensurate with the format of new information generated. Librarians are information professionals and they engage in the selection, acquisition, organisation, storage, preservation, retrieval and dissemination of information to users. They apply special skills and knowledge to undertake this task (Udensi, 2017).

Availability and utilisation of electronic resources and services refers to the effective use of electronic facilities available within and outside the library environment. It is the practical and deliberate effort to maximise the use of library electronic resources and services (Ntui & Udah, 2015). Lee & Lee (2010) in Amanyi, Akor & Madu (2018) maintained that academic library in 21st century is a place where various innovative electronic resources such as e-books, e-periodicals, Compact Discs (CDs), Digital Video Displays (DVDs) and other electronic reading materials are acquired, organised and managed. Electronic resources (or e-resources) denotes library resources in digital or electronic formats which include the information content and/or electronic devices accessible electronically. An electronic information resource is any digital medium where information is derived or extracted from (Kenchakkanavar, 2014). Electronic information resources are carrier of digital information and it also denotes means of electronic information supply. Similarly, Chima and Nwokocha (2013) maintained that an electronic information resources include all form of electronic information carriers that can be used to provide and encouraged effective research activities and development projects. According to Ani, Ngulube & Onyancha (2014), electronic information resources may be blogs, e-books, e-journals, online magazines, online newspapers, web pages, CD-ROM, DVD and electronic databases. Furthermore, the electronic databases that are commonly available in Nigerian university libraries include: ArXiv, Science Direct, EBSCO HOST, AGORA, HINARI, MEDLINE, JSTOR and OARE. The availability and use of electronic information resources by librarians and information professional is an important factors in their research work and service delivery. All university libraries regardless of size are expected to have adequate electronic information resources available for the librarians and their clienteles.

Ani, Ngulube & Onyancha (2014) asserted that the major advantages of electronic resources and services in university libraries include: ease of accessibility to the needed information, minimization of storage space, minimization in cost of acquiring the resources, increase speed in accessing and retrieving the needed information, portability, efficiency and effectiveness in the use of electronic information resources, remote access, round the clock accessibility, and automated routine processing. According to Adeleke and Nwalo (2017), university libraries previously acquire only print resources to their collections, however, the advent and development of ICT in libraries necessitated the inclusion of electronic resources to complement the print resources. Furthermore, the desired needs of electronic resources by librarians, faculty members and researchers have made it imperative for university libraries to acquire, manage and disseminate electronic information resources. Today, most university libraries have electronic resources, as Ani and Ahiauzu (2008) in Adeleke and Nwalo (2017) believed that electronic informational resourced have gradually become a major source of information in Nigerian university community.

All the services provided by libraries are intended to facilitate access and retrieval of information resources by the librarians and their clientele. Literature have revealed that there is a correlation between availability, accessibility and utilisation of electronic resources and services with research productivity of librarians, faculty members and researchers. Some university libraries acquire these electronic resources but access to them are either restricted or impeded by some factors such as erratic power supply, lack of renewal to online database subscription and lack of technical know-how of the librarians to user/deliver electronic services efficiently and effectively. It is against this backdrop that the researchers deem it fit to undertake this research in order to determine the available electronic resources and services in university libraries in Nasarawa State and find out the extent/level of utilisation and satisfaction derived by librarians in the use of electronic resources and services available in their libraries.

Statement of the Problem

Preliminary investigation and literature review showed that, some university libraries do not have adequate electronic resources in their collections to satisfy the information needs of the librarians and their clienteles. Even when these electronic resources are available, access to them are either restricted or impeded by some factors. As a result, they resort to the electronic resources available on the Internet. The void of these qualitative electronic resources in these libraries have forced the librarians and their clientele to the maze of the information explosion and low quality information resources retrieved from various web search engines. Thus, the librarians and the clientele become more confused than being illuminated; the resultant effect of this is a decline in job/research productivity of librarians, faculty members and researchers. A viable solution to these problems is to ensure adequate availability and utilisation of electronic resources and services in university libraries to satisfy the information needs of the librarians and their clientele. Consequently, this will tremendously increase the job/research productivity of librarians and also assist faculty members and researchers through the provision of adequate qualitative electronic resources in accomplishing their academic engagements/assignments.

Objectives of the Study

The main objective of this study is to determine the availability and utilisation rate of electronic resources and services by librarians in university libraries in Nasarawa State, Nigerian. However, the specific objectives are to:

(i) find out the available electronic resources and services in university libraries in Nasarawa State, Nigeria.

(ii) Determine the utilisation rate of electronic resources and services by librarians in university libraries in Nasarawa State, Nigeria.
(iii) Determine the level of satisfaction derived by librarians in the use/delivery of electronic resources and services in university libraries in Nasarawa State, Nigeria.

Research Questions

The following research questions guided the study:

(i) What are the available electronic resources and services in university libraries in Nasarawa State, Nigeria?
(ii) What is the utilisation rate of electronic resources and services by librarians in university libraries in Nasarawa State, Nigeria?
(iii) What is the level of satisfaction derived by librarians on the use/delivery of electronic resources and services in university libraries in Nasarawa State, Nigeria?

Significance of the Study

The outcome of this study will be of great significance to librarians, faculty members, researchers and library administrators. The findings of this research will enlighten librarians, faculty members and researchers of the significance of adequate utilisation of electronic resources in the library to accomplish their academic engagements/assignments. Furthermore, it will assist library administrators in advancing convincing reasons to the university management for adequate funding in acquiring electronic resources to the library. It will also ensure judicious and proportionate financial allocation based on the needs and preferences of the librarians and library clienteles. Additionally, this study will contribute immensely to the corpus of knowledge, as it will provide empirical evidences to researchers and scholars on the availability, utilisation and level of satisfaction derived by librarians in using electronic resources and services in university libraries in Nasarawa State, Nigeria.

Research Methodology

The research design adopted for this study is descriptive survey research design. Nworgu (2006), opined that descriptive survey research denotes studies that are aimed at collecting data on and describing in systematic manner, the characteristics, features or facts about a given population. The area of the study is Nasarawa State, Nigeria. Nasarawa State is located in the north central geopolitical zone of Nigeria.The total population for the study was36 librarians (professional library staff) from three (3) university libraries across Nasarawa State, Nigeria. Furthermore, total enumeration of the population was used for the study because the population is small and manageable (Nwana, 1992). Table1 gives an outline of the total population for the study. Moreover, a structured (closed-ended) questionnaire, observation check-list and interview schedule were used for collecting data regarding this study. The observation checklist and interview schedule were used to check for the availability of electronic resources and services in the three university libraries and the challenges they encounter, 36 copies of the questionnaire were administered to the librarians in the university libraries in Nasarawa State, Nigeria. The generated data from the questionnaire were analysed based on the research questions. The research questions were analysed using frequency counts and percentages.

Data Analysis, Results and Discussion

Table 1: Population and Response Rate of Librarians in University Libraries in Nasarawa State

S/No	Institutions	Number of Librarians	Response Rate
1.	Bingham University, AutaBalifi.	9	8
2.	Federal University, Lafia.	12	7
3.	Nasarawa State University, Keffi	15	5
	Total	**36**	**20**

Research Question One: What are the available electronic resources and services in university libraries in Nasarawa State, Nigeria?

Table 2: Avialability of Electroinc Resources and Services in University Libraries in Nasarawa State, Nigeria

S/N	Electronic Resources and Services	Bingham University Library, AutaBalifi	Federal University Library, Lafia.	Nasarawa State University Library, Keffi
1	Online public Access Catalogue (OPAC)	·	·	Nil
2	Online Databases	·	·	·
3	E-Journals	·	·	·
4	E-Book	·	·	·
5	CD- ROM	·	·	·
6	E-Newspapers	·	·	·
7	E-Magazine	·	·	·
8	Multimedia Products	·	·	·
9	Computers	·	·	·
10	Printers	·	·	·
11	Scanners	·	·	·
12	Photocopy Machines	·	·	·
13	Multimedia Services	·	·	Nil
14	Internet Services	·	·	·
15	Library Websites	·	·	·
16	Electronic Reference Services	Nil	Nil	Nil
17	Electronic Selective Dissemination of Information (SDI)	·	·	Nil
18	Electronic Documents Delivery Services (DDS)	·	·	Nil

From Table 2 above, there is enough evidence to conclude that the various electronic resources and services listed in this study are available across the three universities in Nasarawa State, Nigeria, except OPAC, multimedia services, electronic reference services, electronic Selective Dissemination of Information (SDI) and electronic Documents Delivery Services (DDS) that behaved differently.

Research Question Two: What is the rate of utilisation of electronic resources and services by librarians in university libraries in Nasarawa State, Nigerian?

Table 3: Utilisation Rate of Electronic Resources and Services by Librarians in University Libraries in Nasarawa State, Nigeria

Key: **VHE**=Very High Extent, **HE**=High Extent, **LE=**Low Extent, **VLE**=Very Low Extent

S/N	Electronic Resources and Services	Bingham University Library, AutaBalifi				Federal University Library, Lafia (FULafia)				Nasarawa State University Library, Keffi (NSUK)			
		VHE	HE	LE	VLE	VHE	HE	LE	VLE	VHE	HE	LE	VLE
1	Online Public Access Catalogue (OPAC)	87.5 %	12.5 %	Nil	Nil	14.3 %	14.3 %	28.6 %	42.9 %	Nil	Nil	Nil	Nil
2	Online Databases	37.5 %	50%	12.5 %	Nil	28.6 %	28.6 %	42.9 %	Nil	60%	40 %	Nil	Nil
3	E-Journals	50%	37.5 %	12.5 %	Nil	42.9 %	28.6 %	28.6 %	Nil	100 %	Nil	Nil	Nil
4	E-Book	25%	50%	12.5 %	12.5 %	57.1 %	14.3 %	28.6 %	Nil	100 %	Nil	Nil	Nil
5	CD- ROM	37.5 %	37.5 %	25%	Nil	14.3 %	28.6 %	42.9 %	14.3 %	20%	20 %	40 %	20%
6	E-Newspapers	25%	37.5 %	25.5 %	25%	14.3 %	57.1 %	28.6 %	Nil	40%	20 %	20 %	20%
7	E-Magazine	37.5 %	25%	12.5 %	25%	14.3 %	57.1 %	28.6 %	Nil	40%	20 %	20 %	20%
8	Multimedia Products	25%	50%	25%	Nil	14.3 %	57.1 %	28.6 %	Nil	20%	20 %	40 %	20%
9	Computers	87.5 %	12.5 %	Nil	Nil	57.1 %	28.6 %	14.3 %	Nil	80%	Nil	Nil	20%
10	Printers	100 %	Nil	Nil	Nil	57.1 %	28.6 %	14.3 %	Nil	100 %	Nil	Nil	Nil
11	Scanners	87.5 %	12.5 %	Nil	Nil	57.1 %	28.6 %	14.3 %	Nil	80%	20 %	Nil	Nil
12	Photocopy Machines	100 %	Nil	Nil	Nil	71.4 %	14.3 %	14.3 %	Nil	60%	20 %	20 %	Nil
13	Multimedia Services	37.5 %	12.5 %	50%	Nil	42.9 %	Nil	57.1 %	Nil	Nil	Nil	Nil	Nil
14	Internet Services	87.5 %	12.5 %	Nil	Nil	71.4 %	14.3 %	14.3 %	Nil	100 %	Nil	Nil	Nil
15	Library Websites	75%	25%	Nil	Nil	57.1 %	14.3 %	28.6 %	Nil	Nil	20 %	40 %	40%
16	Electronic Reference Services	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
17	Electronic Selective Dissemination of Information (SDI)	12.5 %	50%	12.5 %	25%	28.6 %	42.9 %	28.6 %	Nil	Nil	Nil	Nil	Nil
18	Electronic Documents Delivery Services (DDS)	12.5 %	37.5 %	25%	25%	57.1 %	14.3 %	14.3 %	14.3 %	Nil	Nil	Nil	Nil

The report on utilisation rate of electronic resources and services by librarians in university libraries in Nasarawa State indicated in Table 3 above revealed that librarians in Bingham University Library mostly use OPAC, and only a few in FULafia library do so, while NSUK appears to be nil. Furthermore, electronic information resources such as online databases, e-

books, e-journals, e-magazines, online newspapers and CD-ROM are highly utilised by librarians in the three university libraries under study. Electronic products and services such as computers, printers, scanners, photocopiers, scanners, multimedia services, Internet services, e-reference services, e-SDI and e-DDS are highly and averagely being utilised by the librarians respectively. The utilisation rate of some of the products/services is low except where such products/services are not available.

Research Question Three: What is the level of satisfaction derived by librarians in the use of electronic resources and services in university libraries in Nasarawa State, Nigerian?

Table 4: Level of Satisfaction Derived by Librarians in the Use/Delivery of Electronic Resources and Services in University Libraries in Nasarawa State, Nigeria

Key: **VHE**=Very High Extent, **HE**=High Extent, **LE=**Low Extent, **VLE**=Very Low Extent

S/N	**Electronic Resources and Services**	**Bingham University Library, AutaBalifi**				**Federal University Library, Lafia.**				**Nasarawa State University Library, Keffi**			
		VHE	**HE**	**LE**	**VLE**	**VHE**	**HE**	**LE**	**VLE**	**VHE**	**HE**	**LE**	**VLE**
1	Online Public Access Catalogue (OPAC)	87.5 %	Nil	12.5 %	Nil	14.3 %	14.3 %	28.6 %	42.9 %	Nil	Nil	Nil	Nil
2	Online Databases	37.5 %	62.5 %	Nil	Nil	28.6 %	14.3 %	57.1 %	Nil	20%	20 %	40 %	20%
3	E-Journals	50%	50%	Nil	Nil	28.6 %	28.6 %	42.9 %	Nil	60%	20 %	20 %	Nil
4	E-Book	25%	50%	12.5 %	12.5 %	28.6 %	28.6 %	42.9 %	Nil	60%	40 %	Nil	Nil
5	CD- ROM	25%	50%	25%	Nil	42.9 %	42.9 %	14.3 %	Nil	20%	20 %	60 %	Nil
6	E-Newspapers	37.5 %	12.5 %	25%	25%	14.3 %	28.6 %	57.1 %	Nil	40%	Nil	60 %	Nil
7	E-Magazine	25%	25%	25%	25%	14.3 %	28.6 %	57.1 %	Nil	40%	Nil	60 %	Nil
8	Multimedia Products	25%	12.5 %	37.5 %	25%	42.9 %	Nil	57.1 %	Nil	20%	40 %	20 %	20%
9	Computers	50% %	37.5 %	Nil	12.5 %	28.6 %	28.6 %	42.9 %	Nil	60%	40 %	Nil	Nil
10	Printers	37.5 %	50%	12.5 %	Nil	28.6 %	28.6 %	42.9 %	Nil	80%	20 %	Nil	Nil
11	Scanners	50%	25%	25%	Nil	28.6 %	28.6 %	42.9 %	Nil	80%	20 %	Nil	Nil
12	Photocopy Machines	62.5 %	12.5 %	25%	Nil	42.9 %	14.3 %	42.9 %	Nil	80%	20 %	Nil	Nil
13	Multimedia Services	37.5 %	12.5 %	50%	Nil	28.6 %	14.3 %	57.1 %	Nil	20%	20 %	40 %	20%
14	Internet Services	50%	25%	25%	Nil	57.1 %	Nil	42.9 %	Nil	60%	40 %	Nil	Nil
15	Library Websites	37.5 %	25%	37.5 %	Nil	42.9 %	14.3 %	42.9 %	Nil	Nil	40 %	60 %	Nil
16	Electronic Reference Services	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
17	Electronic Selective	37.5	37.5	25%	Nil	28.6	Nil	71.4	Nil	Nil	Nil	Nil	Nil

	Dissemination of Information (SDI)	%	%			%		%					
18	Electronic Documents Delivery Services (DDS)	37.5 %	37.5 %	25%	Nil	28.6 %	14.3 %	42.9 %	14.3 %	Nil	Nil	Nil	Nil

Table 4 above shows that more than half of the librarians in Bingham University Library and NSUK are satisfied with the use of electronic resources and services in their libraries while the rest are not, except where such products/services are not available. In FULafia, average number of the librarians are satisfied with the use of electronic resources and services, except where such products/services are not available.

Conclusion and Recommendations

The study concluded that electronic resources and services is important to libraries and librarians in their services delivery and in carrying out their job/research activities. However, the study revealed that, there are variances in the availability, utilisation and satisfaction rate with the use of electronic resources and services by librarians in the three university libraries under study. While the librarians are satisfied with some of the electronic resources and services services, the behaviour is different in others. Furthermore, the observation checklist and interview schedule revealed that electronic reference services is not available across the three university libraries. Moreover, the problems that impedes the full utilisation/service delivery of electronic resources and services by librarians in some of the three university libraries include: epileptic power supply, lack of UPSs to backup power, low bandwidth and network fluctuation, lack of constant updates and subscription to online databases and lack of adequate funding/allocation of budget to electronic resources and services. Hence, the following suggestions and recommendations are offered:

(i) Deliberate efforts by the university management should be made to ensure adequate funding of the university library in order to acquire and make electronic resources and services abundantly available in university libraries in Nasarawa State.

(ii) Librarians should endeavour to utilise the available electronic resources and services in order to increase their job/research productivity.

(iii) Since most of the electronic resources and services are impede by epileptic power supply, low bandwidth/ network fluctuation, lack of renewal /updates to subscription of online databases, the library management should endeavour to tackle these challenges so as to satisfy the information needs of the librarians and their clienteles.

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ENHANCING DISTANCE AND ONLINE EDUCATION THROUGH THE USE OF MASSIVE ONLINE OPEN COURSES (MOOC) IN NIGERIA

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Abstract
the paper discusses general introduction of massive online open courses as advance method of distance/online learning, the state of distance/online learning in Nigeria, statement of the problem that the led to undertake the research, MOOCs as way forward, MOOCs advantages, MOOCs challenges, and challenges of implementing MOOCs in tertiary institutions in Nigeria. The paper concludes and recommends that appropriate ICT facilities should be provided with connected network devices, distance learning software application such as Coursera, Udacity, Iversity or edX should be installed to a specific computer server, campaign awareness should be done to faculty members on how to participate in new learning flat-form, and applicants should be informed massively on the available opportunity in the institutions.

Keywords: Enhancing, Distance Learning, Online Education, Use, Massive Online Open Courses.

Introduction
Massive Online Open Courses (MOOCs) are courses designed for large numbers of participants that can be accessed by anyone anywhere as long as they have an internet connection, are open to everyone without entry qualifications, and offer a full/complete course experience online for free (Luaran, 2013). Massive open online course or more commonly known as MOOC is an online course that is accessible via the web and offers unlimited participation. According to Educause (2014), a massive open online course (MOOC) is a model for delivering learning content online to any person who wants to take a course, with no limit on attendance. MOOC incorporates both the traditional and modern course materials for learning such as videos, readings, projects, assignments and many more.

MOOCs are a relatively recent online learning phenomenon, having developed from the first early examples five years ago, they are now generating considerable media attention and significant interest from higher education institutions and venture capitalists that see a business opportunity to be exploited. They can be seen as an extension of existing online learning approaches, in terms of open access to courses and scalability, they also offer an opportunity to think afresh about new business models that include elements of open education. This includes the ability to disaggregate teaching from assessment and accreditation for differential pricing and pursuit of marketing activities (Yuan and Powell, 2013). In recent years, colleges and universities have been adding more online offerings to meet students' needs and expectations in terms of accessibility and affordability, as a means to accommodate their financial constraints

and to help them balance family and workplace responsibilities. Online programmes are resources for students and working adults, who are increasingly seeking such programmes for degree completion and career advancement.

(i) MOOCs are seen as an important tool to widen access to higher education for millions of people, including those in the developing world, as a means to ultimately enhance the quality of their lives emerging and developing countries are already integrating and implementing MOOCs in their national and professional education initiatives. (Mulder & Jansen, 2015).MOOCs are online courses designed for large numbers of participants, can be accessed by anyone anywhere as long as they have an Internet connection, are open to everyone without entry qualification and offer a full/complete course experience online for free and which has the following feature:

(ii) Massive: designed for, in theory, an unlimited number of participants. This means that the course is designed such that the effort required to provide all services does not increase significantly as the number of participants increases

(iii) Open: access to the course is free, and there are no entry qualifications

(iv) Online: the full course is available through the Internet (using a laptop or desktop computer, a tablet computer or a smartphone)

(v) Course: the offering is a course, meaning that it offers a complete learning experience i.e., it is structured around a set of learning goals in a defined area of study and includes the course materials, assessment tools such as quizzes, feedback, an examination and a certificate of completion.

The State of Distance and Online Education in Nigeria

Online and distance education (ODE) has now been an option for those have less opportunities for normal and ordinary education in Africa especially Nigeria. In this direction (Adekanmbi, 2004) observed that distance education has become an acceptable mode of education in Africa and particularly in Nigeria providing access to the teeming population with major challenges of inaccessible education. National Open University of Nigeria (NOUN) was established in 2002 and is the only accredited singled-mode University providing open and distance learning education in the country. The main academic activities of the students take place at the study centres that are spread across the country as Osang, (2012) indicates in his research that in 2012, NOUN has forty seven (47) study centres all over Nigeria; he further added that facilitations and examinations are held at the study centres. Due to the nationwide spread of the Institution and the opportunities which ICT offers as a catalyst in the delivery of open and distance learning, it is currently used in almost all the stages of the students' study circle namely the application stage, the admission stage, the Registration, the learning stage, the evaluation stage and the transcript stage. In all these stages, the students are expected to be online (except the evaluation stage for now) in order to carry out these activities. In addition, course materials are also hosted on the website for downloading by the registered students. Tutor marked assessment (TMA) are taken online in real time mode. Each of the courses has four TMAs with twenty questions in each TMA. This implies that a student with eight courses must take 32 TMAs to form the 30% of the student's continuous assessment. It therefore means that every NOUN student spends quality time on the internet (Osang, 2012).

The establishment of centre for distance learning and continuing education (CDL&CE) in university of Abuja in 2001 was to meet the desired need and provide the federal capital Tartary (FCT), Abuja an institution whose objectives could meet with ideals and concept formed its establishment with national outlook (COL Int. 2001). In 2015 the Ahmadu Bello University has established Distance Learning Centre with the mission of ensuring qualitative, accessible

and timely delivery of approved academic programmes to its students without distinction based on geographic location, race, sex, religion or other affiliations. The Centre shall be a unique Distance Learning Centre of repute excelling in the delivery of Certificate/Diploma, undergraduate and postgraduate programmes in all fields to advance the scope of ABU's reach in educational delivery as envisaged by the founding fathers of the University (ABU official website, 2017).

Nigeria must utilize this opportunities due some the benefit that Kessler in his report, indicates that will be impacted in many college and universities have online learning. However, he further noted that most agree MOOCs can, as Thrun believes, make a major contribution to global learning, especially where there are limited educational opportunities. In case of Nigeria with the highest numbers of universities and research institutions in sub-Saharan Africa, what huge of amount will be save if the systems been adopted in Nigeria regardless with educational opportunities?

Statement of the problem

Distance learning embraces minimal physical contact between the teacher and students but emphasize much reliance on e-communication, this implies that the learner receives the formalized learning while he/she in remote location (outside the campus) regardless with time differences and geographical zone. Massive online open courses is an advance distance/online learning which can accommodate large numbers of applicants, in Nigeria there is more demand on education both undergraduate and postgraduate due to the fact that necessitated to get knowledge, employability, and life security. By such huge demand on education to tertiary institutions there is no way to for our institutions to accommodate even half of theapplicants unless the system has been changed. The tertiary institutions in Nigeria have got the opportunity to admit only 30-40% student each year. The situation remained unchanged that why this paper highlights possible application of MOOCs in tertiary institution in Nigeria.

MOOCs as Way forward

By creating opportunities to improve the educational system, MOOCs are viewed as having important policy implications related to the future of education. For policy-makers and international organisations, the main interest in MOOCs lies in their perceived potential to enhance access to higher education and lifelong learning by both improving the quality of education available (especially in developing countries) and providing higher education at a cost greatly below that of conventional higher education. Based on the present initiatives (NOU, 2014), the following reasons for governmental involvement in MOOCs are frequently mentioned:

(i) To promote the development of a cutting-edge education
(ii) To stimulate and motivate the adoption of new technologies and new forms of learning.
(iii) To offer expansive, open, free, accessible and always available knowledge (continuing education) within relevant educational fields
(iv) To combine online and campus education
(v) To expand access, marketing and branding, as well as the potential for developing new revenue streams
(vi) To reap the benefits presented by collaboration in virtual learning environments, including peer-to-peer learning, increasing digital skills, amplifying networks and recycling knowledge.
(vii) ƒTo use MOOCs as an admissions tool.
(viii) To increase enrolments and applications from students who want to "try before they buy" when considering university.

In order to be realistic to current situation on funding and running cost of our institution some feature of traditional education should be adopted such as:

(i) Offering credit and charging tuition
(ii) Creating new for-fee courses and programs
(iii) Drawing MOOC participants into existing, full-tuition degree programs
(iv) Increasing class sizes
(v) Licensing fees for use of MOOC materials or data by other institutions
(vi) Fees for additional services, for example, online tutoring, face-to-face instruction with a local instructor
(vii) Grant revenues
(viii) Matchmaking or training for employers(Hollands, &. Tirthali, 2014)

Literature Review

Massive Open Online Courses (MOOCs) have recently received a great deal of attention from the media, entrepreneurial vendors, education professionals and technologically literate sections of the public. The promise of MOOCs is that they will provide free to access, cutting edge courses that could drive down the cost of university-level education and potentially disrupt the existing models of higher education (HE). This has encouraged elite universities to put their courses online by setting up open learning platforms, such as edX. New commercial start-ups such as Coursera and Udacity have also been launched in collaboration with prestigious universities, offering online courses for free or charging a small fee for certification that is not part of credit for awards. Larger corporations such as Pearson and Google are also planning to move into the higher education sector as global players and are likely to adopt a MOOC-based approach as a part of their plans. A new company, Future learn, has been launched by the Open University in the UK, to bring together a range of free, open, online courses from leading UK universities for learners around the world (Futurelearn, 2013).

From open access to open educational resources, and more recently, open online courses, there is growing momentum among HE institutions to participate in this "open" movement. For example, the UK Open Educational Resources programmes launched in 2009, have successfully made a significant amount of new and existing teaching and learning resources freely available worldwide with copyright licenses that promote their use, reuse and re-purposing (JISC, 2012). However, although sustainability issues were a key concern of this programme, the dentification of a sustainable approach for the development of OERs in institutions has proved elusive. With the backdrop of significant amounts of money invested, a criticism of OERs is that they have not yet affect traditional business models or daily teaching practices at most institutions (Hollands, &. Tirthali, 2014).

MOOCs as an innovation with great potential to widen participation, promote lifelong learning and serve as an opportunity to promote higher education opportunities more generally' (QAA, 2014). In 2014 approximately 1,000 MOOCs were available from universities in the USA, and 800 from European institutions, and in several languages besides English (Bates, 2014). MOOCs have certainly led to new discussions about teaching and learning, but the development of MOOCs is also controversial. Arguments seem to fall into two camps. Those who see MOOCs as revolutionary, suggesting universities should seize the opportunities presented by MOOCs (Barber et al, 2013). This position has been echoed by governments, vice-chancellors and in the press, with claims MOOCs would 'change teaching, learning and the pathway to employment'

and that 'nothing has more potential to enable us to reimagine higher education than the massive open online course' (Friedland, 2013).

Others have called MOOCs a disruptive technology (Christensen, 2010), but opinions are divided about their value and importance. Some argue that they open up access to education and hence foster social inclusion, others cynically suggest that they are merely a 'marketing exercise' (Conole, 2013, p 2). As part of a 'digital revolution', MOOCs are celebrated for opening up education on an unprecedented scale through platforms such as Coursera and FutureLearn (Brabon, 2014, p 1). However, some suggest MOOCs are simply another instance of the hype around technology in education, a more modern version of educational broadcasting, which does not affect the basic fundamentals of education (Bates, 2014). Below is some of the application system that used normally in teaching and learning MOOCs

Coursera

Coursera is an educational platform that provides free course online and it is available for everyone from all around the world. This educational platform collaborates with top universities worldwide to offer the best possible courses to the users. There are many courses provided by the websites including Biology, Humanities, Social Sciences and many more. These courses take about six to ten weeks long with the aid of video lectures every week. Coursera provides quizzes, weekly exercises and many more to assess the students' performances. With the use of Coursera, students will be able to learn at their own pace and still receive a higher education (Coursera, 2017)

Features of Coursera

(i) Users get to learn for free.
(ii) There is large variety of courses offered by Coursera
(iii) The assessments at the end of the course enable users to keep track of their progress.

Iversity

Iversity is a platform for Massive Online Open Courses (MOOCs) and offer opportunities to all users including students, professors, lecturers and many more to learn or even use this website as a platform to conduct online courses. Other than that, with this website, professors are also able to extend their hand to thousands of students from all over the world. There are many different courses provided by Iversity such as medicine, biology, physics, law and many more. With Iversity, anyone from all over the globe is able to access education online for free (Iversity, 2017).

Features of Iversity

(i) Users get to learn online anywhere and anytime.
(ii) Money could be saved from paying for university enrollment
(iii) Professors could conduct online classes which are much easier to handle and monitor.
(iv) Thousands of students can be reached by the professors just through Iversity.
(v) Users can also get completion certificates as a proof of their enrollment.

edX

edX is a platform that provides users from all over the globe an opportunity to transform themselves by education through cutting-edge technologies, creative and innovative pedagogies and intensive courses. edX gathers hands with other institutional partners and carry out researches to further enhance their understanding on the students' best way of learning and incorporate that into their courses. edX offers free courses for users to take up and learn online.

This method of learning brings the learning experience to a whole new level and opens an even wider perspective towards learning. As it is online and free, anyone from all around the world can join and learn together with the others (edX, 2017).

Features Of edX

(i) Students get to learn online for free.
(ii) All users; students and professors, get to gather on one similar platform to carry out teaching and learning processes.
(iii) Learning with edX saves time as it can be done online.

In light of the above there are numerous institutions that provide free MOOCs enrolment and which can be these web addresses:

http://www.saylor.org/
https://p2pu.org/en/
https://www.futurelearn.com/
http://academicearth.org/
https://www.openlearning.com/
https://www.canvas.net/
http://alison.com/
https://www.edx.org/
https://iversity.org/
https://www.coursera.org/

How MOOCs Work

MOOCs use Web-based tools and environments referred to as platforms to deliver education and classes in a new paradigm without regard for geographic boundaries and time zones and to much larger audiences in fact, tens of thousands of students. As the box above outlines, various MOOC entities own these platforms. One of the key differences between MOOCs and the previous online approaches is that MOOCs are free. Students can take the courses at no charge, the pedagogy that MOOCs employ also differs significantly from "traditional online learning. Learning is accomplished via a "flipped classroom" model, whereby the instructor employs the Internet and other technologies to allow students to gain knowledge that used to be delivered via a lecture format and then use time in the classroom to work on problems together. The instructor can in turn then act more like a tutor walking among the students rather than a sage on the stage performing a monologue. MOOCs allow scaling of that approach to massive proportions, using social networking tools so that students help educate each other, as well as computerized assignments and assessments(Brian, 2013)..

Unlike older forms of online learning, MOOCs are not asynchronous; they are not like recorded class sessions that a student listens to at his or her own pace sitting in a library, completing one lesson and then starting a subsequent one. Rather, they are similar to on-campus courses, delivered synchronously on a defined schedule usually on a weekly calendar basis. A student in a far-flung location may take a particular lecture and do the related exercises in his or her own time zone during a convenient window of delivery. A student may also make up for missed lectures at his or her convenience, although that will lessen the impact of some aspects of the cohortlike approach to learning with fellow. Grainger, (2013) explained that the Coursera MOOC format is based on three areas of student engagement (as it is with nearly all of the large MOOC platforms)

Video lectures-These are, at their most basic, recorded asynchronous sessions of the lead academic discussing topics related to their MOOC subject. Their format is not prescribed by Coursera and as such, a wide array of presentation styles can be used, from talking heads to interviews to picture in picture (for example, when slides are being used). Subtitles (primarily English, but other languages are being introduced) are provided by Coursera.

Assessment- Assessment can be based on automatically-graded multiple choice questions, either as part of the video lectures (in-video quizzes) or taken separately. In addition to multiple choice questions (MCQs), course teams could also choose to use auto-graded programming assignments (for computer science-based MOOCs) or peer review assessment. Peer review can be used for more open-ended assessment formats and requires students to mark one another's work based on a defined rubric set by the instructor.

Forums- Grainger, (2013) explained that MOOC forums are the main method of student interaction with the content, each other, and the course teams. Forums are typically split into a number of threads, including (but not restricted to): general discussion, subject specific discussion, course feedback and technical feedback. Instructors can actively participate in these forums or choose to use teaching assistants to respond to students, escalating queries when needed. Using this format as a foundation, the academic teams were encouraged to decide the most appropriate pedagogical model within which their subject would be presented, while at the same time establishing a standard structure across all International Programmes' MOOCs.

The structural aspect is considered important in terms of managing learner expectations, while providing a taste of the commitment required studying a single course of one of our full degree programmes. Each course team was asked to develop a six week MOOC with between 5-10 learning hours per week, planning a range of student engagements and engaging content. We asked that teams aim to present no more than 2 hours of lecture material per week, split into 10-20 minute 'chunks'. Pass marks for all MOOCs were set at 40% for a pass and 70% for a distinction, with the exception of the English Common Law MOOC which set pass and distinction marks of 50% and 70% respectively As a result of this design decision, our MOOCs used a range of different platform features and learning and teaching styles. As the English Common Law team included a dedicated learning technologist, working exclusively with the law team, it is perhaps unsurprising that this MOOC used the widest range of tools and services in comparison to the others.

MOOCs Advantages

Although much controversy surrounds the idea of MOOCs, studies have cited several advantages. Some of the areas in which MOOCs have been cited as most beneficial include increased options for accessibility, increased potential for student engagement, and expanded lifelong learning opportunities (Carr, 2012; Duderstadt, 2012).

Accessibility- Participants and instructors note benefits from the enhanced accessibility that MOOCs offer (De Waard, 2011). MOOCs, typically low cost or free, create irresistible appeal for recruiting potential participants. The online format of MOOCs offers access and flexibility and eliminates the need for prerequisites. Leber (2013) stated that, "as online education platformslike Coursera, edX, and Udacity burst onto the scene over the past year, backers have talked up their potential to democratize higher education in the countries that have had the least access". In addition, MOOCs have not been limited to college students, and/or professionals, but even younger students can participate in the MOOC experience.

Student Engagement- MOOCs are designed to enhance student engagement as improving student outcomes is one of the primary goals. According to Trowler and Trowler (2010), Student engagement is the investment of time, effort, and other relevant resources by both students and their institutions intended to optimize the student experience and enhance the learning outcomes and development of students, and the performance and reputation of the institution. Student and instructor participation, motivation, instructional method, and delivery are all important aspects necessary to create a MOOC environment conducive to learning. MOOC educators play a vital role in enhancing student engagement. Rodriguez (2012) highlighted eight important roles identified from an AI-Stanford course that included: amplifying, curating, way (direction) finding, aggregating, filtering, modeling, and staying current. Student engagement can also be enhanced as instructors recognize the learning styles of students and adapt their teaching strategies accordingly.

Lifelong Learning Experiences- According to de Waard (2011), "lifelong learning skills will be improved, for participating in a MOOC forces you to think about your own learning and knowledge absorption". MOOCs allow participants to pursue a particular interest or to continue their professional development. Beyond MOOCs conventional lifelong learning experiences, educational opportunities exist for underprivileged populations as a way to encourage lifelong learning. In addition, employers can utilize MOOCs to keep employees abreast of the competitive labor market throughout their lifetime and in a way that is cost-effective.

MOOCs Challenges

Although some educators recognize the advantages of MOOCs, several challenges exist. Among the most common challenges are individual instruction, student performance, assessment, and long-term administration and oversight.

Individual Instruction- MOOCs require course delivery to a large number of learners. They attract a wide variety of students with different learning styles from all around the world. It is a challenge for instructors to engage students, maintain their interest in the course, and tailor the learning environment to fit the need of each student.A solution proposed by Carr (2012) is machine learning. Machine learning utilizes computers to collect and analyze data from a learning system to test hypotheses about how people learn (Carr, 2012). Carr discussed that, during the course data collection process, every variable is tracked such as a student's pause during a video, increased feedback speed, response to quiz questions, revised assignments, and forum discussion. Collected data is then used to analyze student behavior and test how people learn. In this way, an instructor could tailor the learning environment to fit each student's learning style and needs. However, some researchers disagree with the use of machine learning. They believe that a critical component of education is the interaction between students and teachers. Machines cannot simulate the interaction (Carr, 2012).

Student Performance Assessment- One of the biggest challenges of MOOCs is the assessment of student performance (Rodriguez, 2012). Cheating presents a major challenge of online education (Carr, 2012). How to validate original work to prevent or detect plagiarism is one of the widely discussed challenges in online education (Cooper &Sahami, 2013). Some solutions for the challenge are being proposed by institutions that offer MOOCs. For example, Udacity and edX use test centers for their online courses. However, the cost to students presents a barrier. Coursera attempted to use plagiarism-detection software in detecting cheating. Also, machine learning hasbeen proposed to identify cheating by the analysis of learner behavior.

Long-Term Administration and Oversight- Those on the front lines of MOOC development and implementation warn that, although MOOC's might be open and free to participants, the costs to institutions can be significant. For example, course development assistance through edX can reach upwards of $250,000 per course with an additional $50,000 fee each time the course is offered (Kolowich, 2013). For instructors who develop their own courses, human resource needs include course development (typically 100 hours) and course management (8-10 hours per week) in addition to existing professorial duties. Some institutions have rejected the MOOC concept not because of resources, financial or human, but because of philosophical differences citing that MOOCs are contradictory to the overarching institutional mission. Amherst College was one that recently decided, by faculty vote, to decline an invitation to join edX. Although Amherst faculty were not opposed toexploring innovative teaching or delivery methods, the idea of joining a consortium of institutions through edX was not appealing (Kolowich, 2013).

Challenges of implementing MOOCs in Nigeria

Low Budgetary Allocations for ICT- Infrastructures (Weak Commitment) this is another threat for the implementation of online education in Nigerian. Government allocates very meager amounts budgetary allocations to the development of ICT in the country. This has limited the scope of government's commitment towards full scale implementation of online education in the Nigerian in Tertiary Institutions as being experienced in the country. Osang, (2012) on his findings indicate that internet penetration in Nigeria especially in the rural areas is still very low. Also factors likethe high cost of bandwidth, low computer literacy level as wellas epileptic internet services are some of the major barriers preventing the students from accessing education through open and distance learning using the internet.

Illiteracy- It has been established that one of the major threat to online education in the Nigerian is lack of computer literate staff to handle various online services and applications that are peculiar to ICT in Tertiary Institutions. Without competent hands to handle and monitor the IT infrastructures, there may be no justification for the procurement of equipment.

Energy and Power Factors- During the study, it was clearly established that the failure of the government to implement online education is as a result of irregular power supply. In fact, a few of IT infrastructures have been reportedly damaged due to surges in the electricity distribution grid. A stable and regular power supply has been identified as a precondition for having ICT implementation in the ICT in Tertiary Institutions (Azeez, N.A. et al., 2012).

Lack of IT Experts- Online education being a new innovation in Nigerian Universities in the country is threatened by lack of skilled personnel to manage the infrastructure. The cost of training people to garner up-to-date skills has also skyrocketed and is unaffordable. Because of this, government is completely reluctant in introducing ICT Tertiary Institutions in Nigerian

Conclusions

With the increased number of opportunities come uncertainties. In recent years, the concept of online or distance learning has expanded to include a growing number of Massive Online Open Courses (MOOCs), free higher education courses open for enrolment for any Internet user. MOOCs are a recent trend in distance learning promoted by several prestigious universities. MOOCs promise to open up higher education by providing accessible, flexible, affordable and fast-track completion of universities courses for free or at a low cost for learners who are interested in learning. The popularity of MOOCs has attracted a great deal of attention from higher education institutions and private investors around the world seeking to build their

brands and to enter the education market. Tertiary Institutions in Nigeria are now the appropriate time to adopt massive online open courses that due to the population and numbers of people seeking for admission every year and unfortunately 30-40% get the admission every year, the government should do necessary thing for the better future of generation.

Recommendation

The study recommends that:

(i) Appropriate ICT facilities should be provided with connected network devices
(ii) Distance learning software application such as Coursera, Udacity, Iversity or edX should be installed to a specific computer server
(iii) Campaign awareness should be done to faculty members on how to participate in new learning flat-form
(iv) Applicants should be informed massively on the available opportunity in the institutions

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QUALITY ENTREPRENUERSHIP IN AGRICULTURAL EDUCATION: STRATEGY FOR COLLABORATIVE TEACHING AND LEARNING OF TETIARY INSTITUTIONS IN KANO STATE.

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Abstract
Entrepreneurship in agricultural education is a supposed 100% purely practical course for Nigerian Certificate in Education (NCE II) students based on Nigerian Certificate in Education Minimum Standard for Vocational and Technical Education 2012 Edition. The study was carried out using the NCE II population of 75, whom where distributed to five areas of Agricultural Entrepreneurial interest; poultry, rabbit, fishery, ornamentals and vegetable garden productions with 12, 21, 10, 21 and 11 students per group respectively. Student's contribution and participation was encouraged and a technical report was presented by individual student at the end of the course. A total of 75 questionnaire where administered to all participating students, while only 66 were retrieved 10, 20, 11, 13 and 12 respectively having an items of 20 questions to evaluate their interest, assimilation/understanding, skills acquired and readiness to establish their own agri-business after graduation. Collected questionnaires were calculated based on percentage and these were their responses; 95.45% expressed their interest, 89.39% agreed that learning by doing is the best for learners, 93.94% appreciated the skills acquired, only 18.18% had previous experience and 98.48% would like to go into entrepreneurial agriculture/agri-business after graduation. The authors recommends that the course Entrepreneurship in Agricultural Education be carried out strictly through learning by doing process to enable NCE graduates in agricultural education to be self-employed after graduation, so as to reduce the rate of unemployment in Nigeria.

Keywords: *Entrepreneurship, Agricultural Education, Collaborative Learning, Learning by doing.*

Introduction
The Nigerian economy is in turbulence today, which has made job security for its graduates to be difficult. National Institute for Social Research (NISER) and the World Bank revealed that over 55 per cent of Nigerians of working age are unemployed, representing one in five adults. The World Bank report also indicated that only one in every ten graduates get a job while a recent report by the National Directorate of Employment (NDE) indicated that over 200,000 Nigerian graduates who completed the National Youth Service Corps (NYSC) in the last five years, remained unemployed. Given the challenges that bedevil Nigeria, this paper advocates for the inclusion of entrepreneurship in agriculture at the forefront of its economic development agenda. Entrepreneurship in agriculture as a cornerstone of development strategies for emerging economies has garnered support among a broad spectrum of scholars, policymakers and governments. Many emerging economies as diverse as El Salvador, Israel, Uganda, Vietnam, are making significant strides in realizing their entrepreneurship potential in addition to more known examples such as China and India [Financial Standard, 2009]. This study would probably create grounds for individuals to start their own enterprise.

Entreprenuership

Entrepreneurship has grown into a fascinating and an interesting field of study world-wide, given the present fact of increasing uncertainty and instability brought about by globalization, internationalization, competition and rapid Technology change (Udu & Udu 2015). In terms of concept, different definitions of entrepreneurship exist. For instance, Esomomu (1998), define entrepreneurship as the effective manipulation of human intelligence, as demonstrated in a creative and innovative performance. In other words only human beings can be entrepreneurial in nature, such human beings are special as they are creative and innovative, a situation that makes them to be thinking at the higher realm of existence. Accordingto Anyadike, Emeh and Ukah (2012), job creation has emerged as the single most critical economic challenge facing the world today. Creating job as an entrepreneur is a function of mental ability that an individual has to learn on how to strategically scan the environment for the purposes of identifying immediate needs of the society and possibly provide the needed solutions. In the attempt to provide the needed solutions to societal problems; process are set in motion and it is the processes put in motion that open up the opportunities for engagement of human effort called job creation. Jobs are said to be created when firms are established by entrepreneurs and require people with requisite skills to apply for existing vacant positions. As Tijani-Alawiye, (2004), observes entrepreneurs successfully run innovative enterprises, nurture them to grow and sustain them, with a view to achieving broad socio-economic development goals. In essence entrepreneurs through entrepreneurial development create job opportunities.

Agricultural Education

Agricultural education is generally focused on producing seasoned skilled manpower that will shape and develop agricultural industries around the world (Freddie 2004).The teaching of agricultural education in tertiary institutions is aimed at producing citizens with skills, competencies and reasoned judgment to successfully live and add meaningfully to the economic growth of Nigeria. According to Abdulkareem (2005) a country's development is determined by its individual resources. Agricultural education and training (AET) contributes to poverty reduction for rural populations across the globe (Wallace, 2007). The World Bank (2007) determined four effects of AET on agricultural productivity: (1) enhanced worker productivity; (2) formal education increases farmer's ability to choose prime combinations of inputs and outputs; (3) additional school influences farmer's capacity to innovate and adapt new technologies; and (4) additional education facilitates interaction with commercial markets.

Collaborative Learning

Collaborative learning is an approach to teaching and learning that requires learners to work together to deliberate, discuss, and create meaning. Smith and MacGregor (1992) define the term as follows: "Collaborative learning" is an umbrella term for a variety of educational approaches involving joint intellectual effort by students, or students and teachers together. Usually, students are working in groups of two or more, mutually searching for understanding, solutions, or meanings, or creating a product. Collaborative learning activities vary widely, but most

center on student's exploration or application of the course material, not simply the teacher's presentation or explanation of it. Collaborative learning has been practiced and studied since the early 1900s. The principles are based on the theories of John Dewey (2009) and Benjamin Bloom (1956). Their collective work focusing on how students learn has led educators to develop more student-focused learning environments that put students at the center of instruction. Vygotsky (1999) specifically stated that learning is a social act and must not be done in isolation. This principle is the foundation of collaborative learning.

Learning by Doing

Learning by doing is also referred to as experiential learning, learning through action, learning through experience, learning through discovery and exploration, all which are clearly defined by these well known maxims:

'' I hear and I forget, I see and I remember, I do and I understand."Confucius, 450 BC

'' Tell me and I forget, Teach me and I remember, Involve me and I will learn." Benjamin Franklin, 1750

'' There is an intimate and necessary relation between the process of actual experience and education." John Dewey, 1938

Learning through experience is not a new concept for the college classroom. Notable educational psychologists such as John Dewey (1859-1952), Carl Rogers (1902-1987), and David Kolb (b. 1939) have provided the groundwork of learning theories that focus on "learning through experience or "learning by doing." Dewey popularized the concept of Experiential Education which focuses on problem solving and critical thinking rather than memorization and rote learning.

Principles of Experiential Learning (EL)

Unlike traditional classroom situations where students may compete with one another or remain uninvolved or unmotivated and where the instruction is highly structured, students in experiential learning situations cooperate and learn from one another in a more semi-structured approach. Instruction is designed to engage students in direct experiences which are tied to real world problems and situations in which the instructor facilitates rather than directs student progress. "The focus of EL is placed on the process of learning and not the product of learning" (UC Davis, 2011, para 6).Vygotskij (1999) also claimed that teaching should be built on students' interests. He argued that it is a general psychological law that if our interest is to be awakened, something needs to catch our attention and include some elements of novelty; otherwise, there will be no results. Dewey argued for the scientific method in teaching, i.e. raising questions, making hypothesis, testing, observing and reflecting upon what happened as a way of developing in most subjects (Dewey, 1938/1998). He claimed that the scientific method is the only authentic means at our disposal if we are to understand the meaning of our everyday experience in the world. Maybe that is why the expression "learning by doing" has become the Dewey motto.

Aim of The Study

The aim of the study is to adopt entrepreneurship in agricultural education as a strategy for collaborative learning by doing for quality education in Nigeria.

Objective of The Study

(i) To economically empower agricultural education graduates in agro business
(ii) To identify agro-business opportunities for graduates in agricultural education
(iii) To make available sources of information for agro-business to graduates of agricultural education
(iv) To provide entrepreneurial skills to graduates of agricultural education
(v) To assist agricultural education students on implementation of agro business ideas.
(vi) To implement the general concept and principles of entrepreneurship in agricultural education as enshrined by Nigerian Certificate in Education minimum standard for Vocational and Technical Education

Materials

A total of 75 questionnaires were employed and administered to all participating students, having 20 item questions to evaluate their interest, assimilation/understanding, skills acquired and readiness to establish their own agro-business after graduation.

Methods

The study was carried out using the NCE II population of 75 from, Department of Agricultural Education, Federal College of Education (Technical) Bichi, Kano State Nigeria, whom where distributed to five areas of Agricultural Entrepreneurial interest; poultry, rabbit, fishery, ornamentals and vegetable garden productions with 12, 21, 10, 21 and 11 students per group respectively. Student's contribution and participation was encouraged and a technical report was presented by individual student at the end of the curse and A total of 75 questionnaire where administered to all participating students, while only 66 were retrieved 10, 20, 11, 13 and 12 respectively having an items of 20 questions for statistical analysis to evaluate their interest, assimilation/understanding, skills acquired and readiness to establish their own agri-business after graduation. Collected questionnaires were calculated based on percentage

Results and Discussion

Section 'A' of the questionnaire was applied to evaluate the students' gender, age and class. Out of the 66 retrieved questionnaire 62 where male while 4 where female with 93.94% and 6.06% respectively as shown on table 'A'. The ages of students ranges from 15 to 20 had 78.79%, ages of 21 to 25 had 21.21% while there was a zero (0%) response for 26 to 40 years as represented on table 'B'. All students where from NCE II.

Section A-Biodata

Gender for respondents

Response	Number of response	Percentage (%)
Male	62	93.94
Female	4	6.06
Total	66	100

Table A

Age of respondents

Response	Number of response	Percentage (%)
15-20	52	78.79
21-25	14	21.21
26-30	0	0
31-35	0	0
36-40	0	0
Total	66	100

Table B

SECTION B

This section evaluates the following; students interest, on collaborative teaching and learning, learning by doing in collaboration as compared to lecture method, appreciation of skills acquired, previous experience by students and readiness to engage in agri-business by students after graduation.

A total of 63 respondents showed interest on collaborative teaching and learning with 95.45% as against 3 with 4.55% as shown in table 1. For rating of learning by doing as compared to lecture method, 59 students with 89.39% agreed that learning by doing is the best, 5 students with 7.58% says it is better while 2 students with 3.03% says it is good as represented on table 2.

Interest by respondents on collaborative teaching and learning.

Response	Number of response	Percentage (%)
Yes	63	95.45
No	3	4.55
Total	66	100

Table 1

Rating learning by doing by collaboration as compared to lecture method

Response	Number of response	Percentage (%)
Good	2	3.03
Better	5	7.58
Best	59	89.39
Total	66	100

Table 2

In terms of appreciating the skills acquired, 62 students agreed to have gain skills with 93.94% as against a negligible 6.06% with 4 responses as indicated on table 3. Only 12 students responded to have had previous experience with 18.18% while 54 number of students with 81.82% had no previous experience, which confirms the important objective of the study as represented on table 4.

Appreciation of acquired skills

Response	Number of response	Percentage (%)
Yes	62	93.94
No	4	6.06
Total	66	100

Table 3

Previous experience

Response	Number of response	Percentage (%)
Yes	12	18.18
No	54	81.82
Total	66	100

Table 4

Readiness to engage in agri-business by students after graduation

Response	Number of response	Percentage (%)
Yes	65	98.48
No	1	1.52

Total	66	100

Table 5

On readiness for students' engagement into agri-business after graduation, only 1 student did not comply with 1.52% while 65 students indicated their readiness to engage into agri-business with 98.48%.

Conclusion and Recommendations

Based on this study, these responses forms a great deal in achieving success on collaborative teaching and learning entreprenuership in agricultural education in Nigerian tertiary instituttions. Finally, we would like to refer to Dewey (1938/1998) again and his view that the scientific method of raising questions, making hypothesis, testing, observing and reflecting upon what happened is a way of developing the teaching of most subjects including Agriculture. Furthermore, he did not see inquiry only as a way of gaining knowledge, but also as a way of learning how to solve problems. This study recommendsthat in preparing agricultural students for life after school, we therefore need to adopt collaborative Teaching and learning by doing.

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EFFICACY OF PEER GROUP TEACHING APPROACH ON ACAMIC PERFOMANCE OF PRE SERVICE PHYSICS STUDENT IN COLLEGE OF EDUCATION ZARIA NIGERIA

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Abstract
The aim of the study was to determine the efficacy of peer group teaching approach on academic performance of pre service teachers when taught Mechanics. 146 students participated in the study. Research design was quasi-experimental with pre-test post-test setting. Mechanics Academic Performance Test (MAPT) and peer group structured lessons plans were the Instruments used. Two research questions and two null hypotheses guided the study. The statistic used in testing the hypotheses was t-test. Result showed that peer group teaching approach was effective in enhancing academic performance of students. Adequate use and further studies on the approach on other topics and academic levels was recommended.

Key Words: Efficacy, Peer- group teaching approach, Academic performance, Pre Service teachers, Mechanics, Gender

Introduction

Physics is an exciting intellectual subject that inspires young people and expands the frontiers of our knowledge about Nature. It generates fundamental knowledge needed for the future technological advances that will continue to drive the economic engines of the world. Physics is an important element in the education of chemists, engineers and computer scientists, as well as practitioners of the other physical and biomedical sciences.(IUPAPM1999)

Physics extends and enhances our understanding of other disciplines, such as the earth, agricultural, chemical, biological, and environmental sciences, plus astrophysics and cosmology - subjects of substantial importance to all peoples of the world. Physics improves our quality of life by providing the basic understanding necessary for developing new instrumentation and techniques for medical applications, such as computer tomography, magnetic resonance imaging, positron emission tomography, ultrasonic imaging, and laser surgery.

Due to the importance Physics, it is made one of the subjects studied by pre-service teachers in Colleges of Education and Universities in preparation for dissemination of what they learn to younger students who would go into Physics related career courses in life. The pre-service teachers are expected to learn the subject for cognitive knowledge and skills required to serve effectively as teachers. The pre-service teachers also undergo some pedagogical skills acquisition training needed for teaching. Recent study of performance of students in Physics in Colleges of Education in NIGERIA has not been satisfactory (Aina 2014).

The unsatisfactory performance has been associated with the lecture teaching method mostly employed by lecturers in Colleges of Education in Nigeria. .According to learning pyramid developed by National training laboratories in Betel, Maine lecture method of teaching enables the learner retains only about 5% of what was learnt. According to the learning pyramid, students retain 50% of what they learn using group discussion,70% when practice by doing and 90% when students practice teaching others. From the summary of the learning pyramid the participatory teaching approaches appear to be more effective than the passive teaching methods. This effective option of participatory approach made present research to explore the

efficacy of peer group teaching approach on students' academic performance in Mechanics which is one of the topics in Physics that has concepts and skills required in learning almost all topics in Physics.

Statement of the Problem

The general performance of students learning physics in colleges of education in Nigeria was observed to be unsatisfactory by Aina (2014). Unsatisfactory performance is not befitting to the statue of prospective physics teaches that is needed for scientific and technological development of Nigeria. It was also reported by Aina (2015), and Aghruwhe & Akiri (2017)most teachers of science use lecture methods for their teaching which was diagnosed to provide about 5% of what is learnt as provided in leaning Pyramid. It was also observed by Tulborel (2012) that teaching strategies employed by teachers have positive effect on students learning outcome. In the learning pyramid it was also highlighted that participatory teaching approaches provide an opportunity for retaining almost 90% of what is taught to student. Therefore the worry on the performance of prospective Physics teachers and the need to explore more of effective teaching strategies for teacher skill development justify the need for testing the efficiency of peer group teaching approach on course among pre-service teachers.

Research Questions:

Based on the problem identified two research questions were raised that guided present research. They are stated thus;

Research Question One:

What is the mean academic performance scores of students taught Physics using peer group teaching approach and these students taught using lecture method.

Research Question Two:

What is the mean academic performance scores of male and students taught physics using peer-teaching approach.

Null-Hypotheses

The following null-hypotheses were raised and tested at 5% significance level.

Ho1 There is no significance difference between the mean academic performance scores - student taught physics using peer-group teaching approach and those taught student using lecture method.

Ho2 There is no significant difference in the mean academic performance scores of male and female student taught Physics using peer-group teaching approach.

Methodology

The population of the study comprised of seven hundred and fifty one (751) NCE Physics students in regular and part-time programmes of Federal College Education Zaria. Intact class of 57 and 123 NCE Physics students in part-time and regular physics programme were selected to serve as experimental and control group for the study.

The research design of the study was quasi-experimental design with pre-test, post-test setting. The instrument used was Mechanics Academic Performance Test (MAPT) with a reliability of 0.76. MAPT was designed by the researcher which comprise of 40 stem in multiple-choice form. Peer group tutoring strategy flow chart was used for administration of treatment to experimental group. For treatment purpose ten peer tutoring class lesson plans were made and

students in experimental group were give an orientation on some required skills training for peer teaching Students in the experimental group were divided into groups of five each group was a given a topic to study interact and present to the whole class. The control group was taught similar subject content using traditional lecture method in 10 consecutive interaction with a research assistant.

Results:

Research Question One:

What is the mean academic performance scores of students taught Physics using peer teaching approach and those students taught using lecture method.

Table 1: Mean and standard deviation scores of students taught Physics using peer-Teaching approach and those taught using lecture method.

Group	N	Mean	Sd	Men difference
Experimental	57	57.92	15.31	10.32
Control	89	47.61	13.63	

Table 1 shows the mean academic achievement score of experimental and control group to be 57.92 and 47.61 with standard deviation of 15.31 and 13.63 respectively. The mean difference is 10.32 indicating a large superiority of experimental group over control group, to determining whether the difference was significant will hypothesis one was tested using t-test.

Null hypothesis One

There is no any significant difference between academic performance mean scores of student taught Physics using peer-teaching strategy and those taught using lecture method.

Table 2: t-test analysis of post-test mean scoresof experimental control group.

Group	N	Mean	Sd	Df	t_{cal}	P_{value}	Remark
Experimental	57	57.92	15.31	144	0.19	0.03	Significant
Control	89	47.61	13.63				

Significant at p <- 0.05

Table 2: Show that t value calculated is0.19 and a P_{value} of 0.03 which in lower than alpha significant value of 0.05. This therefore indicates that the difference in performance between experimental and control group was significant. The difference must have been as a result of treatment, i.e using peer-teaching approach to experimental group. This shows that peer-teaching strategy was effective.

Research Question two:

What is the difference in the mean academic performance scores of male and female students taught physics using peer-teaching approach.

To answer RQ2, mean academic performance scores of male and female student exposed to the peer-teaching strategy was computed and presented in table 3.

Table 3: Post-test mean scores of male and female subjects in experimental group.

Group	N	Mean	Sd	Men difference
Male	34	60.51	12.63	5.18
Female	23	55.33	13.32	

Table 3 shows the mean academic performance scores of male and female subjects exposed to peer-teaching to be 60.51 and 55.33 respectively. The mean difference was found to be 5.18. However to test for the significance of the observed difference null hypothesis two was tested.

Null hypothesis two: There is no any significant difference in the academic performance mean score between male and female students exposed to peer-teaching strategy. T-test statistic was used to test null hypothesis one and the result in presented in table 4.

Table 4: Result of t-test analysis of post-test mean scores of male and female subjects exposed to peer teaching approach.

Group	N	Mean	Sd	Of	Tot	Praw	Pert
Male	34	60.51	12.63	55	0.79	0.02	Significance
Female	23	55.33	13.32				

Significance atp<0.05

From table 4.0 the calculated 0.79 with P value of 0.02 and degree of freedom of 55. Determined P value in lower than P= 0.05the significant limiting value. As such mean difference between male and female subjects in experimental group significant. The difference could be attributed to the treatment is not gender friendly.

Summary of findings:

(i) There was a significant difference in the mean academic performance scores between experimental and control group.

(ii) There was a significant difference in the mean academic performance scores of male and female students in the experimental group.

Discussion of result

The finding which show effectiveness of peer-group teaching approach agrees with the findings of Naseerali (2013) who found that peer-group tutoring was effective in teaching physics of secondary schools.

Hussain, Anwar and Majoka (2011) also agree that peer-teaching enhance students ability to acquire knowledge and comprehension. The effectiveness of the peer group teaching approach could be due to a lot of activities in reading rehearsing and peer tutoring involved before lesson presentation. However, Aina (2017) found out no significant difference between experimental and control group when taught electronics. The no difference could be due to size of sample used.

Conclusion

Based on the outcome of the research it can be concluded that peer-group teaching approach is effective in enhancing academic performance of students of Physics. The approach is also gender sensitive

Recommendation

Based on the efficacy of the peer-group approach determined it recommended that the method should be adequately explored by physics teachers with a view to enhance better performance. Further studies should also be conducted on other topics and level to accertain wider sffect and use .

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EFFECTS OF INTERACTIVE-ENGAGEMENT TEACHING STRATEGY ON ACADEMIC PERFORMANCE OF AMONG MALE AND FEMALE SECONDARY SCHOOL CHEMISTRY STUDENTS IN NASARAWA STATE

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Abstract
This study investigated the effects of interactive-engagement teaching strategy on academic performance of chemistry students in Nasarawa state. A total of 1,154 students constituted the target population. 152 students formed the sample for the study. Simple random sampling using ballot method was used to select four (4) schools for the study. Two schools were selected based on the fact that their mean scores were not significantly different. The subjects were divided into two groups; the experimental group N= 93 and the control group N=59. The study adopted the pretest, posttest, quasi experimental and control groups design. The subjects in the experimental group were taught using interactive-engagement strategy, while the subjects in the control group were exposed to the lecture method for a period of six weeks. The topic taught was chemical equilibrium. The instrument used was Chemical Equilibrium Performance Test (CEPT) adapted from WAEC and JAMB past examination questions. The reliability coefficient of the instrument was 0.75. The instrument was validated by experts. Two research questions were set to guide the study and two null hypotheses were tested. t-test statistics was used at $p<0.05$ significance level. Result of the study showed that there was significant difference in the mean scores of experimental and control groups in favour of experimental group. Thus, it was concluded that academic performance on chemical equilibrium concepts can be enhanced by the use of interactive-engagement strategy. It was therefore recommended that chemistry teachers should imbibe the use of interactive-engagement strategy with other teaching strategy to teach chemistry for better learning and understanding since interactive-engagement strategy alone is not gender friendly.

Keywords: Interactive-engagement, Academic performance, Gender.

Introduction
Chemistry is one of the major science subjectoffered at the senior secondary schools. Ababio (2010) defined chemistry as a branch of pure science which deals with the composition properties and uses of matter. Thus chemistry can be defined as a branch of science that deals with substances of which matter is composed, their properties and reactions to form new substances. Chemistry is a very important science subject that is required for studying science related professional courses like medicine, pharmacy, engineering, agriculture among others. The importance of chemistry as a valuable science subject is further emphasized in the Joint Admissions and Matriculation Board syllabuses (JAMB, 2010/2011), it is stipulated that a minimum of credit pass in Chemistry is required as one of the criteria for admitting candidates aspiring to study science-related courses in tertiary institutions.

In spite of the important position of chemistry among other science subjects and related disciplines, literature revealed that, students' performance in chemistry at Senior Secondary School Examinations (SSSCE) have been consistently poor, (Udo, 2008, Asim, 2008 & WAEC Chief Examiners' report 2010-2015). The performance of senior secondary school students in chemistry has been attributed to passive teacher-centred instructional strategies mostly the Lecture Method (Olorukooba, 2001, MDG's project, 2011). This lecture method of teaching is a strategy commonly used by most teachers in Nigerian schools. This method is teacher-centered and characterized by

verbal one-way presentation of ideas, concepts, generalization and facts. The teacher does most of the activities in form of talking while the students are either passive listeners or slightly involved and does not take care of the varied needs of the learner especially in the teaching of chemistry.

As a result of the shortcomings of the lecture method, other teaching strategies have been investigated such as process-based learning method and computer assisted learning (MDGs project, 2011), inquiry and demonstration methods (Obeka, 2010), use of conceptual change instructional strategies (Lakpini, 2012) among others. However, little have been done in interactive-engagement strategy especially in the teaching of chemistry.

Interactive-engagement is a teaching strategy in which students are engaged in minds-on activities involving the pre-read of textbooks prior to the teaching of a concept or concepts. At the beginning of the instruction, students are giving interactive session to discuss the concept amongst them which was previously given as a pre-class assignment. Questions on the concepts are posed by the teacher at the end of the interactive session, students then discuss the questions, choose answers using flashcards and then the teacher clarifies misconceptions, (Ayodele, 2011). The use of a Student-Response-System (SRS) or flash cards (as the case may be) serves as a source of instant feedback which informs the teacher and the learners of goal progress. Thus, the steps to be followed when using Interactive-engagement strategy as adopted by Mazur (2006) involves;

(i) Giving a pre-class assignment on the concept to be taught
(ii) Giving students interactive session to discuss the concept at the beginning of the instruction
(iii) Asking questions based on the pre-class assignment by the instructor
(iv) Students in groups are allowed to engage in a class discussion
(v) Students choose their answers using flashcards
(vi) Based on students' feedback, the instructor gives a detailed explanation of the concept
(vii) The instructor summarizes what has been learned

The influence of gender on students' performance in Nigeria has for a long been a concern to educational researchers. Surprisingly, no consistent result has been obtained. Some researchers found that male students achieve significantly higher than female students while some reports indicated that the reverse is the case. Studies on gender and academic performance such as that of Usman (2007) and Ibrahim (2008) showed that boys perform better than girls in terms of academic performance but a study conducted by Atadoga (2005) pointed out that there is no gender-related difference in academic performance. From these reports, it could be inferred that the findings about the effect of gender on performance though widely spread, are inconclusive. It is for this reason that this study looked into the effects of interactive-engagement teaching strategy on academic performance among male and female secondary school chemistry studentsin Nasarawa, Nasarawa State.

Purpose of the study

The main purpose of this research is to determine the effects of interactive-engagement teaching strategy on student academic performance in chemical equilibrium concepts among secondary school chemistry students and to also find out whether or not academic performance in chemical equilibrium concept, using interactive-engagement strategy was gender-dependent or gender-related.

Research Questions

(i) What is the difference between the mean performance scores of students taught chemical equilibrium concepts using interactive-engagement strategy and those taught using lecture method?

(ii) What is the mean performance score of male and female students taught chemical equilibrium concepts using interactive-engagement strategy?

Research Hypotheses

$H0_1$ There is no significant difference between the mean scores of students taught chemical equilibrium concepts using interactive-engagement strategy and those taught using lecture method.

$H0_1$ There is no significant difference between the mean scores of male and female students taught chemical equilibrium concepts using interactive-engagement strategy.

Methodology

The research design used for this study was pretest, posttest quasi experimental design. A pretest was administered to both the experimental and control groups to determine the equivalence in academic ability in chemical equilibrium concept. Then a posttest was administered to all groups after the treatment to determine the effectiveness of the treatment on the concept taught.

The population of the study comprised all SS 2 chemistry students in nine senior secondary schools in Nasarawa Local Government Area of Nasarawa state. All these schools are co-educational. Simple random sampling using ballot method was used to select four (4) schools within Nasarawa LGA. A class in each of the four schools was pretested to determine their level of academic equivalence. Mean scores obtained from the pretest were subjected to ANOVA statistics to determine any significant difference. Two schools were selected based on the fact that their mean scores were not significantly different; they were assigned into experimental group consisting of 93 students with 59 males and 34 females and control group consisting of 59 students with 37 males and 22 females.Thus, a total of 152 students were used for the study.

Chemical Equilibrium Performance Test (CEPT) was the instrument used for the study which was adapted from past WAEC, JAMB past examination questions and New Certificate Chemistry textbook. CEPT was validated by two senior lecturers with the rank of PhD in science education department of Ahmadu Bello University, Zaria and two chemistry teachers of senior secondary school after which some questions were modified. The reliability coefficient of the instrument was determined using test-retest method at interval of two weeks (Tuckman, 1975). It was found to be $r = 0.75$

Two major treatments were given to the groups. The experimental group was taught using interactive-engagement strategy while the control group was taught using the lecture method. The students exposed to interactive-engagement teaching strategy were asked to read on the concept that was taught followed by a pre-class assignment. Students were asked to group themselves into mixed group of seven or eight students per group, flashcards were distributed to the students, with each student having the two alternatives; true (white) and false (blue). Students were given interactive session to discuss the concept at the beginning of the instruction. Questions were posed to the students based on the pre-class assignment, students were given time to engage in class discussion in each group to ascertain the correctness of the alternative chosen by each member of the group. The students were then asked to choose their answers using their flashcards. The researcher used the feedback from the flashcards to correct wrong answers and then gave detailed explanation of the concept and summarized. Students in the control group were taught the same

concept using lecture method. At the end of the treatment, the posttest was administered to both experimental and control groups. The scores of both groups were collected and subjected to t-test statistics at significance level of $P \leq 0.05$.

Results

Research Question One: What is the difference between the mean performance scores of students taught chemical equilibrium concepts using interactive-engagement strategy and those taught using lecture method?

Table 1: Mean and Standard Deviation of Posttest Scores for the Experimental and Control Groups

VARIABLE	N	Mean	Std. Deviation	Std. Error Mean	Mean Difference
MALE	93	31.17	8.60	0.89	6.46
FEMALE	59	24.71	6.91	0.90	

Table 1 revealed that the academic performance means scores for the experimental and control group was 31.17 and 24.71 respectively with the mean difference of 6.46.This means the experimental group achieved higher than the control group, and this can be attributed to the treatment. i.e. the use of interactive-engagement strategy.

Research Question Two: What is the mean performance score of male and female students taught chemical equilibrium concepts using interactive-engagement strategy?

Table 2: Mean and Standard Deviation of Posttest Scores of Male and Female Taught Interactive-engagement Strategy

VARIABLE	N	Mean	Std. Deviation	Std. Error Mean	Mean Difference
EXPERIMENTAL	59	33.56	7.88	1.03	6.53
CONTROL	34	27.03	7.30	1.42	

Table 2 presents data on the mean and standard deviation of the posttest scores of male and female students. From the result obtained, there was a difference in the mean posttest scores of the male and female students taught using interactive-engagement strategy. The male students mean score was 33.56 while that of the female was 27.03 with a mean difference of 6.53. This means that male students achieved higher than the female students and this can be attributed to the treatment. i.e. the use of interactive-engagement strategy.

Null Hypotheses

H_{O1}: There is no significant difference between the mean scores of students taught chemical equilibrium concepts using interactive-engagement strategy and those taught using lecture method**.** To test this hypothesis, the mean academic performance scores of students in experimental and control groups were compared using t- test at $P< 0.05$ level of significance. The result obtained is presented in Table 3

Table 3: t-test Analysis of Academic Performance Mean Scores of Experimental and Control Groups

VARIABLE	N	Mean	Std. Deviation	Df	t-Cal	p-value	Remark
EXPERIMENTAL	93	31.17	8.60	150	3.12	0.00	Significant
CONTROL	59	24.71	6.91				

p< 0.05 significant level

The result from Table3 showed that the P- value is 0.00 which is less than 0.05 level of significance at 150 degree of freedom with a t-cal of 3.12. The null hypothesis of no significant difference between the academic performances of students taught chemical equilibrium concepts with interactive-engagement strategy and those taught with lecture method is rejected. The result obtained showed that teaching with interactive-engagement strategy is effective in enhancing students' performance in chemical equilibrium concepts.

H_{O2}: There is no significant difference between the mean scores of male and female students taught chemical equilibrium concepts using interactive-engagement strategy. To test this hypothesis, the mean academic performance scores of male and female students were compared using t- test at P< 0.05. The result obtained is presented in Table 4

Table 4: t-test Analysis of Posttest Mean Scores of Male and Female Students in Experimental Group

VARIABLE	N	Mean	Std. Deviation	Df	t-Cal	p-value	Remark
MALE	59	33.56	7.88	91	3.77	0.00	Significant
FEMALE	34	27.03	7.30				

p<0.05 significant level

Table 4 showed that the P- value of 0.00 which is less than 0.05 level of significance with the degree of freedom of 91 and a t-cal of 3.77. Hence the null hypothesis which stated that there is no significant difference between the mean scores of male and female students taught chemical equilibrium concepts using interactive-engagement strategy is rejected. This implies that interactive-engagement strategy is not gender friendly in teaching chemical equilibrium concepts as a result of higher mean performance score of male students.

Discussion

The findings of this study showed that the students taught chemical equilibrium concepts with interactive-engagement had a higher mean performance score than the students taught using lecture method. This finding agreed with that of Khwanda, Kriek and Basson (2007) whose work showed that interactive-engagement strategy have positive impact on students' conceptual understanding of concepts. Antwi, Hanson, Sam, Savelsbergh and Eijkelhof (2011) suggested that the use of interactive-engagement approaches promote better conceptual understanding than the

lecture approach. The result is also in accordance with the findings of Churukian (2002) who found that conceptual understanding of students in the experimental classes who were taught using interactive-engagement strategy is better than that in the control class which received traditional teaching strategy. The students in the experimental classes express positive responses towards the activities conducted to involve them actively in the learning process.

Findings from this study revealed that the mean performance scores of male and female students taught chemical equilibrium concept using interactive-engagement strategy were statistically significant. The finding from this study indicates that gender has effect on learning chemical equilibrium concepts with interactive-engagement strategy as a result of higher performance mean score of male students as compared to that of the female students. The result of this finding is in line with that of Nwagbo and Okoro (2011) which revealed that interaction pattern enhanced achievement of students but also showed that the average scores for boys were consistently higher than that of girls. The result of this study disagrees with that of Lyn Morgan, (2008) whose result indicated that no significant correlation was found in gender when interactive whiteboards was used during instruction. The result of this finding is not in line with that of Wachanga, Mugiira and Mbugua (2013) who observed that gender has no significant effect on chemistry performance test. The result also disagrees with that of Njue (2010) who established that gender has no significant effect in chemistry performance test.

Conclusion

Based on the findings of this study, it was concluded that the use of interactive-engagement strategy enhanced the academic performance of chemistry students on chemical equilibrium concepts at senior secondary school**.** Also, male students taught using interactive-engagement strategy achieved higher in chemical equilibrium concepts in senior secondary school than female students taught using the same strategy.

Recommendations

Based on the findings of this study, the following recommendations were made.

(i) Professional Associations such as Science Teachers Association of Nigeria (STAN), Nigeria Educational Research and Development Council (NERDC) shouldguide the teachers on how to use interactive-engagement strategy as a means of enhancing participation of students in meaningful activities that involve social-interaction amongst the students which could be achieved through seminars.

(ii) Interactive-engagement teaching strategy should be incorporated in science teachers' training curriculum in order to produce teachers who are able to handle this mode of teaching

(iii) There is need for Government to see the provision of adequate teaching materials; flashcards, visual and audio-visual aids to facilitate the use of the strategy.

(iv) Chemistry teachers should imbibe the use of interactive-engagement strategy with other teaching strategy to teach chemistry for better learning and understanding since interactive-engagement strategy alone is not gender friendly.

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DEPLOYING WHATSAPP SOCIAL GROUP FOR EFFECTIVE TEACHING OF LISTENING SKILLS TO LARGE CLASS: EXPERIENCE FROM USMANU DANFODIYO UNIVERSITY, SOKOTO

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Abstract
This study investigated the use of WhatsApp Social Group in presenting listening materials for interactive discussion to promote listening skills among undergraduate students of Usmanu Danfodiyo University, Sokoto. The main objectives of the study were to find out whether posting listening materials on WhatsApp Social Group will promote the right discussions among the subjects with the view of developing listening skills and also to appraise possible challenges in doing so. The study was an action research which as aimed at addressing the problem of presenting listening materials to large group of students. The population of the study was the 318 students offering the course: English Language in Primary Education. The study purposively selected the 241 students who have WhatsApp account for the study. The instruments for data collection included the four listening materials posted for discussion and the various postings made by the students. The data collected were analysed both quantitatively using frequency count and percentage and qualitatively focusing on some specific postings. The findings showed that WhatsApp Group can be used effectively to present listening materials to large group of students to stimulate discussions leading to development of listening skills. The study also revealed that keeping students focused on the topic of discussion instead of social interactional issues is the major challenge facing the use of WhatsApp Group for educational purpose. The study recommended among others that WhatsApp application should be used by language teachers to present listening materials for discussion that will improve the learning of listening skills.

Key Words: WhatsApp English language Listening skills Collaborative learning.

Introduction
The use of Social Networks among young people often describe as children of digital age is carried over to schools, particularly the university. Students of Usmanu Danfodiyo University, Sokoto are not excluded from this craze of using social networks for personal communication and social interaction. University Students' use of WhatsApp and their perceptions regarding its possible integration into their education, therefore, becomes topic of attention to researchers particularly those in the areas of pedagogy. As rightly observed by Gasaymeh (2017), the popularity of social network sites among university students is an indicative of its potentials to be used for educational purposes. This therefore mean that if properly harnessed and channelled towards educational activities, social network sites could become good ally for teachers, in the context of this paper, language teachers, in their continuous quest for methodology that works better for the teaching and learning of language. However, available evidence shows that not much has been explored of the wide range of benefits of social media platforms for the purpose of educating, particularly among the lecturers of Usmanu Danfodiyo University, Sokoto.

WhatsApp social site stands distinctly among Nigerians in general, and university students in particular, probably because of the support it enjoys from mobile phone service providers who have encouraged many to use the app as a result of varying affordable tariffs for social networks. As a result of this availability across all mobile platforms, it becomes the number one consideration for possible domestication for lesson delivery. WhatsApp Messenger, according to Church and de Oliveira (2013) and Sahu (2014), is a smartphone and web-based instant message application that allows users to exchange information using a variety of media which include text, image, video, and audio formats. Similarly, WhatsApp simplicity as a tool to connect to many as well as easily modification for academic purpose have been attested to by writers such as Gachago, Strydom, Hanekom, Simons, and Walters (2015). According to them, WhatsApp can be adapted in higher education to create immediate connections, encourage reflection, and facilitate coordination in formal and informal learning. In language teaching and learning specifically, Tarighat and Khodabakhsh (2016) observed that it is quite handy in language assessment. In addition, according to them, students can record their speech and use WhatsApp to share their recordings with their teachers and other students. These positive comments have encouraged this writer to explore the possibility of using WhatsApp to present listening lesson to university students to encourage participation in listening activities.

Listening skill is one of the most important language skills. Psycholinguistics facts have attested to the importance of listening to the acquisition of language on one hand and language learning on the other. For instance, if a child is born deaf, he / she will never acquire spoken language since the auditory channel will not be able to receive language sounds on which the child will built his / her language. Similarly, a learner of second language needs the listening skill to enable him / her follows language in use in the classroom, at play as well as at home for the language principles introduced in the class to process effectively. Similarly, at adult life, learners require the ability to listen effectively so that contributions made to social discourse could be meaningful, apt and relevant. These various importance of listening make it mandatory for teachers to explore better way of teaching the skills of listening effectively.

Despite the importance of listening skills mentioned above, the present writer's experiences, as language teacher trainer on one hand a language teacher on the other have shown that listening skills particularly in the context of English language has been neglected. Out of several students on teaching practice which this writer has had privilege to observe on practical teaching experience, very negligible number presented lesson on listening skills. Similarly, the interaction of the writer with the permanent teachers on the subject did not yield encouraging answers. One of the possible reasons for the situation could be as a result of lack of adequate materials to teach listening skills. This is evident in the absence of listening skills activities in most course books in use in various secondary schools in the country.

The problem of teaching listening skills becomes more pronounced when a teacher has to deal with a large number of students in a class. This is so with university students such as Primary Education Studies in the Faculty of Education and Extension Services, Usmanu Danfodiyo University, Sokoto, which number is considered to be too high to enhance adequate interaction between students and listening materials. Furthermore, listening skill is just one out of the several other aspects of language skills such as reading, writing and grammar which need to be taught in PED 209 the course that is the pivot for this study. Therefore, the lecturer will not have enough time during the regular class hours to encourage interaction of students with listening materials for the purpose of teaching listening skills. The problem become more disturbing when one considers the facts that the students have to learn the skills to enable them teach same effectively at primary school level. It is on the above backdrop that the

researcher decided to embark on Action Research to find out if using WhatsApp social media platform will serve as panacea for the problem.

The Objectives of the Research

The study was designed to determine the influence of WhatsApp social group on promoting the right discussion among users. The following specific objectives were pursued during the course of the study:

(i) To find out if posting listening materials through WhatsApp Social Group will stimulate discussion on the targeted listening skills.
(ii) To establish the possible challenges of using WhatsApp Social Group for the purpose of teaching listening skills.

Research Questions

To achieve the above objectives, the following research questions were formulated for the study:

(i) Would posting audio and video listening materials on WhatsApp Social Group generate appropriate discussion that could lead to development of listening skills?
(ii) What are the challenges of using WhatsApp Social Group for teaching listening skills?

Review of Related Literature

Gasaymeh (2017) investigate first year university students' use of WhatsApp for personal and educational purposes as well as their perceptions of the formal integration of WhatsApp into their education. The population of the study was 154 university students of Alhussein Bin TAlal University. The design used for the study was cross-sectional using questionnaire as instrument. The results showed that the use of WhatsApp was common among the participants in the study. Students use WhatsApp for personal and social purposes on a daily basis. However, among the participants, the use of WhatsApp for educational purposes was limited. The participants had positive dispensation to the using of WhatsApp in their formal learning if it was introduced. The study thus recommended WhatsApp integration in teaching and learning.

Akpan and Ezinne (2017) conducted a study to find out the effectiveness of WhatsApp as a collaborative tool for learning among undergraduate students in the University of Uyo, Akwa Ibom State. The study had two objectives two research questions and two hypotheses. The population of the study was all the 400-level science education students in the Faculty of Education, University of Uyo. The sample used for the study was sixty (60) science education students. The research was carried out using quasi-experimental design. While the method of data analyses included mean and standard deviation to answer the research questions while Z-test and t-test were used in testing the null hypotheses. The findings revealed a significant difference in the retention level of students taught with WhatsApp application and those taught using the conventional approach of teaching.

Sayan (2016)investigated the effects of students' use of WhatsApp instant messaging for learning and improving performance in examination. The study offered external activity around student-centered learning for the exam preparation in order to raise their achievement using WhatsApp. The sample of the study was 92 higher students (teacher candidates) offering the ''Introduction to Educational Sciences Course'' in the Faculty of Education, Biruni University, İstanbul, Turkey. Sixty students that agreed to participate in the study were divided into two groups of 30 each. One group studied for the examination through the traditional way while the other experimental group did same using WhatsApp messaging text, asking questions and getting answers, sharing materials like pictures, graphs, tables and of course discussing on the

course content via the medium. The findings showed that WhatsApp has a positive effect on the final achievement, and working in smaller groups is more benefitting while studying.

Hamad (2017) conducted a study in College of Science and Arts, Majarda King Khalid University, English Department with a population of 36 female students from first level who were studying Listening and Speaking course. The researcher used analytical descriptive method to conduct the study. Two instruments of students' questionnaire and instructor observation were used for collecting data. The findings supported using WhatsApp to enhance students learning and enthusiasm. The findings also showed that using WhatsApp helped students to develop English language skills, enriched their vocabulary and learn from their mates' mistakes. The study also highlighted some challenges from the experience in the areas of preparing the materials and having discipline in the group.

Mwakapina and Mhandeni's (2016) study explored the blending of WhatsApp Social Networking Tool (WSNT) in English Second Language (L2) learning class interactive. The main objectives were to find out the roles and extent to which WhatsApp social network helps in the improvement of English Proficiency as well as challenges of using the tool in L2 learning. The study was conducted using university first year undergraduate students who were pursuing different programs, with English grammar as a compulsory course. WhatsApp social network was blended in the grammar course for a period of one semester. Thereafter, evaluation forms and WhatsApp discussion board were used in data collection. The findings revealed that the tool played a great role in helping students learn English interactively and collaboratively. In respect to advantages and challenges, it was revealed that the benefits of blending WhatsApp social network in L2 classroom far outweigh the challenges. The study recommended that application can be fully utilised for education purposes.

Mistar and Embi (2016) examined the use of WhatsApp as a learning tool and how it could help the students to enhance their language learning. They also tried to find out the perception of students on the significance of using the tool as it suits the young generations' lifestyle. Data were gathered from 20 respondents from Kuala Pilah Pre-University students via a set of questionnaires distributed for them to answer within 15 to 20 minutes. The data was summarized to identify the usefulness of the learning tool to the students. The findings of the study suggested that the use of WhatsApp is significant in helping the students learning the language better. It also enhanced their proficiency in using the English language. This study recommended that the usage of WhatsApp should be encouraged to the students and institutions should provide internet facilities as a top priority in today's education.

Augustine and Nwaizugbu (2018) investigated the effect of WhatsApp as a tool to deliver instruction to 400 level trainee teachers who offered Computer in Education course in the Department of Educational Management, University of Port Harcourt. The study used both experimental and descriptive survey designs. The sample was 72 Educational Management (EDM) Accounting/Geography and 65 EDM Economics trainee teachers that were randomly selected from the population to form the experimental and control groups respectively. The experimental and control groups were respectively taught via WhatsApp group discussion platform and face-to-face discussion strategy. The research instruments were researchers' developed Computer in Education Achievement Test (CEAT) and an interview guide. Four (4) research questions and three hypotheses guided the study, while the analytical tools were mean, standard deviation, qualitative analysis and t-test using SPSS version 22. The findings showed that there was no significant difference between the mean values of the two groups at post-test level. The study recommended that the university lecturers should always supplement

their classroom teaching with newer technologies such as WhatsApp group discussion and other social networking platforms since they offer the students all times and on-the-go learning opportunities.

Methodology of the Research

The research method used for the study was Action Research. Action research, according to Lesha (2014) is a teaching, learning, and decision-making process that can be used in a myriad of ways to assist the learning process of students and teachers. Primarily, action research is geared towards carrying out systematic study of observed teaching and learning problem among a particular set of learners with the aim of seeking for solution to resolve the problem. This study was carried out on the premise of finding out possible solution to the problem of teaching large group listening skills using listening materials.

The population of the study were all the students that registered for PED 209 course: English Language in Primary Education numbering three hundred and eighteen (318). The course is compulsory for students of Primary Education Study who are expected to learn English language skills and grammar to enable them teach same at primary school after graduation. The sample of the study was to be the whole population conforming to the principle of action research but was purposively limited to students who have WhatsApp enabling phones. This category of students numbered 241, and thus, formed the sample of the study.

To start the investigation, the researcher created a WhatsApp Group and added all the 241 students who were using the application. Four listening materials focusing on various aspects of listening skills were recorded and converted to MP3 audio format using 'Format Factory' application. This was to enable every student to access the listening material when posted on the WhatsApp platform created. The listening materials were posted one after the other with a directed discussion using the cue from the researcher to guide the attention of the students on the contribution they should make. The discussion was carried on both real-time and delayed. The students and the researcher agreed that the hours of 8 to 10 p. m. including weekends should be observed for live discussion while students who could not take part should post their contributionsany time within the period the discussion on listening material last. The data collected were analysed both quantitatively and qualitatively to answer the research question set for the study.

The Results

Research Question 1: Would posting audio and video listening materials on WhatsApp social media platform generate appropriate discussion that could lead to development of listening skills?

To answer this question, the students posting in response to the listening materials provided guided by the series of questions raised by the researcher were analysed for both quantity and quality. The percentage of postings made by the students over four listening materials presented were quantified in terms of number and relevanceon one hand and whether directly on the listening material or a comment on earlier one done by others. The following are excerpts from the platform to illustrate the categories mentioned:

(i) Listening, however, is something you consciously choose to do. Listening requires concentration so that your brain processes meaning from words and sentences..... (Attentively) (Example of Relevant Posting and direct)

(ii) He didn't say casualties he said "HEARING IS CASUAL" (Example of relevant posting but indirect)

(iii) Pls stop posting unuseless (sic) messages on this group to avoid problems (Example of irrelevant posting but indirect)

The results are captured in Tables 1 and 2.

Table 1: Posting on the Listening Activities by Type and Relevance

Activities	Direct	%	Indirect	%	Total	Relevant	%	Irrelevant	%	Total
1	17	34.7	32	65.3	49	20	40.8	29	59.2	49
2	70	45.2	85	54.8	155	100	64.5	55	34.5	155
3	65	41.1	93	58.9	158	133	84.2	25	15.8	158
4	73	41.1	105	58.9	178	139	78.1	39	21.9	178

Source: Students' Postings on PED 209 WhatsApp Group

Table 1 presents the postings of the students on the four listening skills over a period of eight weeks. Each listening material was open for discussion for two weeks after one live discussion. The Table shows that 49 posting were made in respect of the first listening material which subject matter was difference by listening and hearing. Out of this number, 17 postingsrepresenting 34.7% were direct, addressing the content of the listening materials itself while 32 postings representing 65.3% were indirect because they were comments made on those who made direct comments. In terms of relevance, 20 postings representing 40.8% were considered relevant because they stayed on the subject matter of the first listening materials. Twenty-nine postings representing 59.2% were considered irrelevant because they were side comments which were not reflective of the content focused on in the listening materials.

The second listening materials focused on informative listening skills. Students were requested to listen and discuss the information passed across in the material. The data showed that a total of 155 postings were made during discussion. Out of this number, 70 postings representing 45.2% were made direct on the subject matter while 85 posting 54.8% were comments made on the posting of others. Similarly, out of the posting, 100 postings representing 64.5% were relevant because they focused on the information in the listening materials while 55 representing 34.5% were considered irrelevant to listening materials.

The third listening materials focused on inferential listening skills which required the students to extract information which were not explicitly stated in the content of the listening materials but can be deduced. Because of the nature of the skill, video material was used so that students could be aided by both verbal and visual cues. The data on Table showed that 158 postings in total were made during the discussion. Out of these number, 65 were made direct to the topic of discussion. This represents 41.1% of the total posting. Ninety-three posting representing 58.9% were contributions made on existing postings. The Table also showed that 133 postings representing 84.2% were directed at the issues in the listening material therefore were considered relevant while 25 posting representing 15.8% judged irrelevant.

The final listening material focused on evaluative listening skill. The students were required to listen to the materials and evaluate the information they have listened to. A total of 178 postings were made during the discussion. Out of this number, 73 were direct to the topic of discussion. This represents 41.1%. The remaining 105 representing 58.9% were comments made aboutpostings of others showing agreement or disagreement to the opinion expressed. In terms of relevance, 78.1% of the postings amounting 139 were considered relevant while 39 representing 21.9% were not relevant to the listening materials.

The researcher was also interested in the nature of the discussion, that is whether the students would participate better in live discussion or delay. Delay participation refers to postings that come within the two-week period slated for each listening exercise. Therefore, the postings according to the time of participation were presented in Table 2.

Table 2: Posting on Listening Activities by Time

Activities	Live Posting	%	Delayed Posting	%	Total
1	10	20.4	39	79.6	49
2	52	33.5	103	64.5	155
3	67	42.4	91	57.6	158
4	63	35.4	115	64.6	178

Source: Students' Postings on PED 209 WhatsApp Group

The Table showed that out of the 49 postings done in the first listening material, 10 representing 20.4% were live contributions while 39 representing 79.6% were delayed contributions over a period of two weeks. Also, 52 out of the 155 postings made in respect of second listening material representing 33.5% were made during live discussion while 103 postings representing 64.5% fell within delayed category. Similarly, out of 158 postings record in respect of the third posting, 67 representing 42.4% were live contributions while 91 representing 57.6% were delayed contributions. Finally, 63 postings representing 35.4% out of the total 178 postings made in respect of the fourth listening materials were done during the live discussion while 115 postings representing 64.6% were made during the delayed period. The data presented so far showed that the response to the question as to whether WhatsApp platform can be used to present and discuss listening skills effectively is in affirmative.

Research Question Two: What are the challenges one could face when using WhatsApp social media platform for teaching listening skills?

To answer this question, the experience on the PED WhatsApp Group provides insights into the possible challenges. The very first challenge has to do with composing the group. To do that successful, the phone numbers of the students have to be saved in the lecturer phone for identification purpose. The large number of students involved made it cumbersome to capture the students, then, add them to the group. In addition to that, if all the students in the class were on WhatsApp it would have been more difficult to handle since they were above three hundred (300) and WhatsApp group can only accommodate 250 participants.

The second challenge observed was making the students focus on topic under discussion instead of using the Group for social interaction. For example, when the WhatsApp Group was created, the class was informed that no one should make posting until every member of the class had been added to the group. Before finishing enlisting the students, the platform was littered with congratulatory messages to the members of the class. In as much as the researcher appreciated the zeal of the students to be alive in the group, which of course is a good development, nonetheless, the instruction of not doing anything on the platform until

when told to do so was violated. Similarly, the high number of irrelevant contributions observed in Table 1 is an indication that managing the postings in terms of relevance will be very difficult.

The problem of keeping the students focused was battled throughout the interaction. At a point, the platform became chaotic and all sorts of posting were made:

> This msg is for everyone. If u find any child crying on the road showing his/her address on a piece of paper and asking u 2 take him/her to that address, please if u're so sympathetic, take that child 2 d Police Station and don't take him/her to that address. It is a new way of gang Stealing, Raping & Kidnapping. Pls, forward 2 all Ur loved ones. One msg from u may save a life or property. Plz circulate. Let us b security conscious (Excerpt from the platform)

At this point, the researcher had to impose sanction to bring sanity into the discussion. In this regard students that were notorious in posting notices on the platform were briefly expelled from the class as deterrent to others. In addition, students who post irrelevant information on the platform loose part of their Continuous Assessment marks:
"The following students have lost 2 points from their CA for posting unrelated information on the platform: 1610408171, 1610408198, 1720408050, 1610408051, 1610408001" (Excerpt from the platform)

As soon as postings like this went up, sanity was restored on the platform. Where a student made wrong posting, he / she was quick in offering apology: 'Am sorry for irrelevant posting (it) is a mistake' (Excerpt from the platform)

Similarly, there was challenge of getting them to make contributions in the first place. This was evident in the number of postings in respect of the first listening task. It recorded the list contributions. When this was realised, announcement was made in the class that contributions earn some marks from Continuous, hence, every contributor to discussion received 2 marks. Consequently, the contributions improved significantly in the remaining three tasks.

Summary of Findings

Based on the data collected and analyzed, the following findings about the use of WhatsApp in teaching listening skills have emerged:

(i) WhatsApp can effectively be used to present listening materials to large number of students for both live and delayed discussion.
(ii) Students make more postings during delayed discussion that the live one
(iii) The contributions made by students are more elaborate and comprehensive in delay postings.
(iv) Preparing large students in WhatsApp Group is a challenge in using it for class discussion particularly if the class is large than 250 students.
(v) Controlling the relevance of the postings to the discussion is another challenge that user of WhatsApp Group as a teaching tool will encounter.

Discussion of Findings

The findings of this study support earlier researches such as those of Sayan (2016), Gasaymeh (2017) as well as Akpan and Ezinne (2017) who all found WhatsApp social network improved the learning of their subjects. For instance, Gasaymeh (2017) reported positive dispensation to the use of WhatsApp application in formal learning among his subjects just as the current

study. Akpan and Ezinne (2017) on their part found that WhatsApp as a collaborative tool for learning among undergraduate improved the retention level of students better than the conventional approach of teaching. Sayan on his part reported positive effect of WhatsApp on the final achievement, the subjects.

The findings of the current study also support the findings of researchers who worked on the use of WhatsApp platform for the study of language. For example, the current findings support the findings of Hamad (2017) that using WhatsApp as learning tool helped students to develop English skills, enriched their vocabulary and learn from their mates' mistakes. This study's findings equally confirmed the challenges of using WhatsApp group particularly in having discipline in the group. Similarly, the current findings uphold the submission of Mwakapina and Mhandeni's (2016) that WhatsApp Social Networking Tool helped learners of English as a Second Language learn interactively and collaboratively. The current study findings equally collaborate Mistar and Embi (2016) findings that the use of WhatsApp as a learning tool significantly helped their students learn English language better and also enhanced their proficiency in its use.

Recommendations

In line with the findings of the study, the following recommendations have been made:

(i) WhatsApp application should be used by language teachers to present listening materials for discussion that will improve the learning of listening skills.

(ii) Language teachers should allow the discussions on WhatsApp platform to be live as well as delayed so that those who could make live contributions could do that later.

(iii) To manage discussion on WhatsApp platform for maximum benefits, language teachers should use both reward and punishment to instil discipline among participants

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GAME AS AN OPTION TO ENHANCE COLLABORATIVE LEARNING OF BIOLOGY AMONG SENIOR SECONDARY SCHOOL STUDENTS IN NIGERIA

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Abstract
Science and technology education is a major pillar to a national development and understanding the key concepts in science is paramount to effective learning of most core science subjects particularly at the secondary school. This paper stressed the need to use instructional game as teaching tool by biology teachers at secondary school level for effective delivery of various difficult themes in the biology curriculum as means of enhancing students' performance and retention of biological concepts. The paper highlighted the various benefits of games as teaching tool in form of diagram. A demonstration of instructional card game in teaching cell division was equally presented. Some criteria for designing instructional games were mentioned and some limitations of games as teaching tool were mentioned. The paper recommended that Biology teachers should endeavor to give brief explanation of the topic and the best way of playing the game before the learners begins. This is done to create a level ground for all players to enhance their effective participation.

Keywords: Instructional game, Biology, Performance, Retention.

Introduction
Science and technology is a major pillar to a national development and understanding the key concepts in science is paramount to effective learning of most core science subjects particularly at secondary school. Several research reports such as those of Aladejana (2013) and Enohean (2015) acknowledge that an instructional strategy is crucial to the understanding of science concepts. Effective delivery in science classroom requires the teacher to step outside the realm of personal experience into the world of the learners since the learner must be engaged for effective commitment that will make learning take place. According to Jafari, Madani and Maghsoudi (2013) the perennial methods of teaching science through listening, looking and note taking have not been successful in attaining the goal of science education, hence, the need for innovative approach that will engage learners in active learning process. It was also suggested by Gredler (2001) that for meaningful learning of science concepts to take place the learning environment must be made friendly through innovative approached that will motivate and trigger the interest of the learner.

Jafari *et al* (2013) are of the opinion that to engage a wide and diverse group of students with varying degrees of motivation, commitment, ability, and learning styles, the language of play may be more appropriate since it is understood by all learners regardless of their age and background. Amin and Masoumeh (2015) opined that learning takes place better when learning content is presented through a specific or combination of approaches that will lead to direct involvement of learners in the active learning process. Active learning is said to allow learners to take part in their education process hence giving them the opportunity to have meaningful learning of concepts. Moursund (2007) pointed out that for learning to be meaningful, it must be individually constructed. Learning takes place as student process, interpret and negotiate the meaning of new information and this is said to be made possible with games. Rybka (2017)

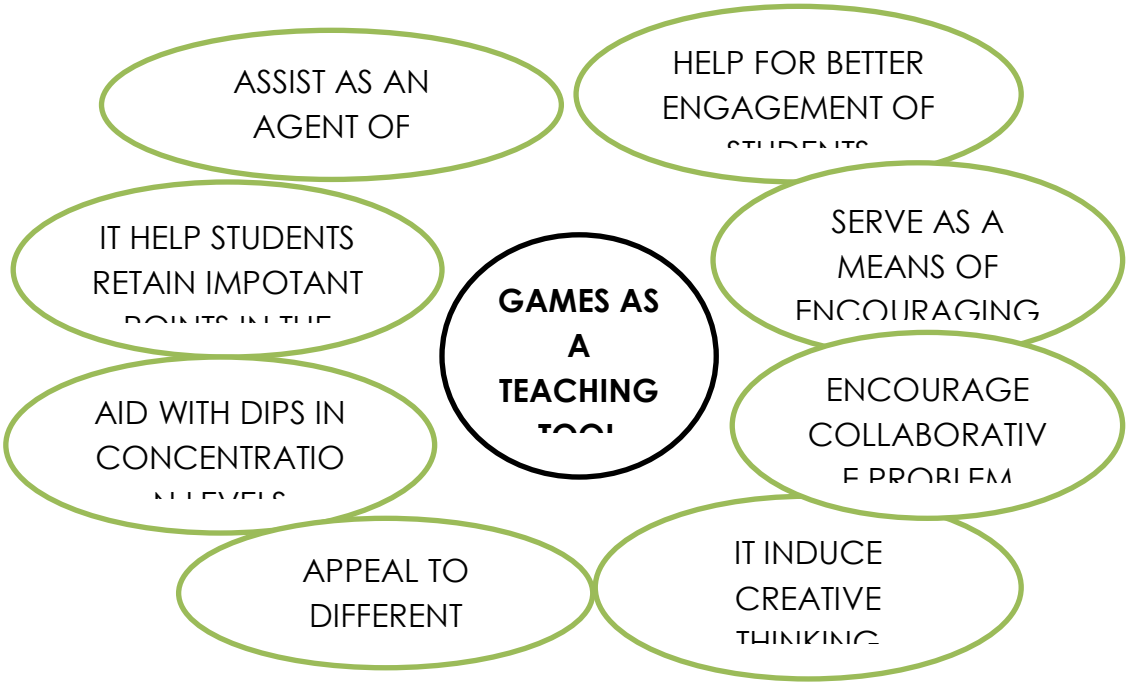
suggested games as teaching approach that can shape the learning environment. Games offer a medium for students to explore and interrogate information in a fun and interactive way. These expositions, therefore made it mandatory for science teachers to explore these great potentials that games have in promoting the teaching and learning of biology.

Game could be defined as an activity performed to have some fun. Games can make the students more focused in learning because they are forced to learn. Asghari, Kalani and Ghanaei (2013) were of the opinion that games can lower anxiety, thus making the acquisition of input more likely. They also stressed that games are highly motivating and entertaining, hence, can give shy students more opportunity to express their opinion and feelings. The use of games attract the students to learn science concepts because it is fun and make them want to have experiment, discover and interact with their environment. The use of games in teaching biological concepts is a way of making the lessons more interesting, enjoyable and effective. Iwuanyanwu, obeka and Lakpini (2016) were of the opinion that there is need to use games as innovative techniques for meaningful teaching of sciences particularly biology, to equip learners with skills and knowledge, relevant for national development which is the major goal of education. This paper therefore presents some food for thoughts for biology teachers, particularly at secondary level of education in Nigeria, to look at the direction of games in their quests for methodology that will enhance their teaching of biology concepts for better performance of learners.

Games as Teaching Tool

Game as an instructional tool requires learners to participate in a competitive activity with preset rules. According to Liu and Chen (2013) a game is a system in which players engage in an artificial conflict, defined by rules that result in a quantifiable outcome. Rybka (2017) defined simulation games as computer-generated dynamic models that present theoretical or simplified models of real-world components, or processes. Amin and Masoumeh (2015) affirmed that gaming has been used to support students' learning and improve academic performance. Klisch, Miller, Beier and Wang (2012) affirmed also that games offer unique structure to complement traditional teaching strategies and infuse teaching with energy, spark innovative thinking and provide diversity in teaching methods.

Games are highly flexible and can be easily adapted to suit varying learning environments and settings which can add value of interactivity in learning of students. There are various types of game frames that can be modeled to teach different disciplines for better understanding of concepts. Apart from inviting students to learn curriculum content in a fun and relaxed manner, games also expose students to other development skills during game play via sequential, verbal, visual and kinetic and other game based activities. Some of the benefits of instructional games as adapted from Boyle (2011)are represented diagrammatically below:



Types of Instructional Games

There are various games that could be used in the classroom. These include puzzle, card games, board games and computer games. There are explained thus:

Puzzle as Educational Game

Puzzle is described as a type of game that enhances problem solving. Moursund (2007) confirmed puzzle as a game that can be used to solve a particular mentally challenging problem or accomplish a particular mentally challenging task. Some examples of puzzle games that can be used in classroom situation include crossword puzzles, jigsaw puzzles, and logic puzzles. Puzzle assists in brain exercise that draws upon one's general knowledge, recall of words defined by short definitions or pieces of information, and spelling ability. It helps to maintain and improve one's identification of biological nomenclature, spelling skills, and knowledge of many miscellaneous titbits of information in science. For example, Amedu (2015) used Jigsaw game in teaching Biology in Akwnanga, Plateau State, Nigeria and found that it positively affected the performance and retention of learners in the subject area. Puzzle is an activity that assists learners in computational thinking which is a necessary skill for every learners' development. To draw, label, and have better knowledge of concept understanding in biology, computational thinking is a need of every child's analytical ability. Puzzles as games provide an excellent environment to explore ideas of computational thinking. The fact that puzzle games are available both in a non-computerized form and in a computerized form helps to create this excellent learning environment which every biology teacher can manipulate as a teaching tool for better knowledge delivery in the classroom.

Instructional Card Games

Instructional Card games involve the development of concepts of a particular topic under consideration into cards for the purpose of teaching and learning. An educational card game could be in either electronic or non-electronic form. Such cards could be diagrammatic in nature representing the images of the major concepts, the concepts and the interpretation of the concepts in orderly arranged manner in which the learners are expected to play by matching the images with right concepts and their corresponding interpretations respectively.

Generally these games are used in science classes to expand concepts such as in food chain, food web, set matching etc. A key feature of educational card games is the opportunity to apply subject matter knowledge in a new context. For example, the card game on cell division requires the players to match the different images of the stages of mitosis or meiosis with the corresponding concepts and their interpretation which was seen to enhance learner ability to differentiate between the stages and the happenings at different stages. One innovative way of using game as an effective teaching tool is to permit students to design their own card games using particular content. For example, the development of card games on problematic areas in biology such as genetics, evolution or nervous system.

Educational Computer Games

An educational computer game can be defined as an electronic medium with all the characteristics of a gaming environment that had intended educational outcomes targeted at specific groups of learners. Educational computer games are said to have the capacity of enhancing individualized learning as well as the development of proficiency by allowing users to interact with objects and manipulate variables. They are most effective when designed to address a specific problem or teach a certain skill in the subject curriculum, for example in biology, computer game could be designed to teach evolutionary trend in the classification of organisms. This could enhance students' understanding of developmental trend among organisms of different phyla.

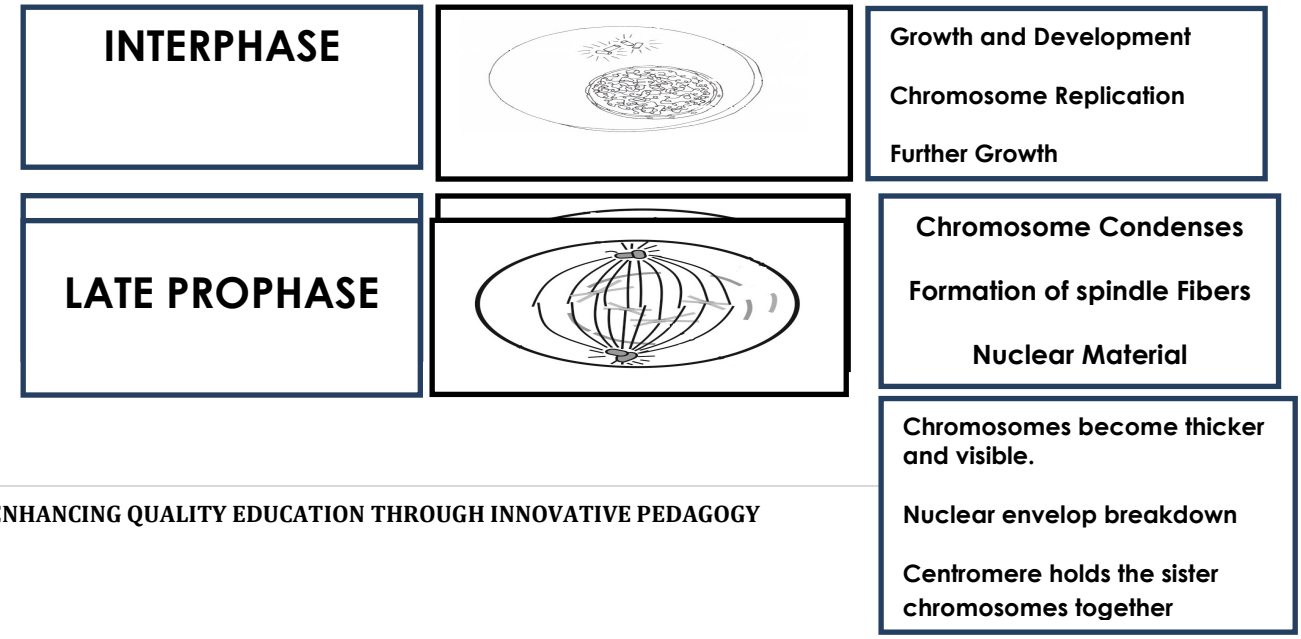
Criteria for Designing Academic Games

To make a well-designed game for academic purpose could be very challenging but interesting. It requires the application of knowledge and skills. The following criteria must be put into consideration when designing an instructional game:

(i) Winning should be based only on the demonstration of knowledge or skills
(ii) The game should address important concepts or content.
(iii) The dynamics of the game should fit the age and developmental level of the players.
(iv) Students should not lose points for wrong answers

Use of Card Game in Teaching Biology

Card game that enhances interactive and collaborative learning among students was designed by this researcher and used in teaching cell division concepts to secondary school students. The card game used to teach the different stages of mitosis was in three sets: one set represented the images of the stages, another set carried the corresponding concepts and the third set contained the interpretation of the happening at different stages of the mitosis as presented in the diagram below:



The students were divided into small groups of five. Five different sets of these three cards were shuffled and given to each group. The playing of the game is done with each member of a group going to the market to pick a card at a time. They were required to match each card containing the image of the different stages of mitosis with the corresponding concepts card and that carrying the interpretation of each stage. Each time a player picks a card that does not tally with what is required of him, the card is returned to the market and he loses his chance of play at that time. This is done round all the players until each player puts together the correct set of cards demonstrating the different stages of mitosis.

The first player in the group that makes a complete set in the correct order emerges the winner. The scoring of the game is done in accordance with the time used by the player to have a correct set of complete stage of mitosis expected. Through this game, students were found to have better understanding of the different concepts of mitosis, such as easy identification of the interphase, early prophase, late prophase, metaphase, anaphase, early telophase and late telophase stages. Players were also found to engage in intense interaction and discussion based on correctness of the matching of the card and identifying the stages through the use of images. Students through the game were able to differentiate easily between mitosis and meiosis. This game was also observed by the researcher to foster collaborative learning among the learners in terms of assistance between the slow learners and the fast learners in the class, which was found to enhance active participation of all types of learners in the class, thereby, enabling teachers' accommodation of individual differences among learners.

Limitations of Games as Teaching Tool

There are some challenges to the use of games in teaching science subjects which teachers have to overcome for the maximum benefits to be derived:

(i) Since game attracts the interest of majority of the learners, they the all become active thus making the class noisy. This makes the class difficult for teacher to control. The rowdiness of the class as a result of the game does not allow for effective class management.

(ii) Through game, the teacher only had a little time to explain the material and give better contributions to the learning process of the learners. This is because the teacher had to go round the class to observe students' participation and responses to their various questions concerning the game.

Recommendations

The paper offers the following recommendations for the use of games in teaching Biology:

(i) Teachers should use games to explain topics such as food chain, food web, genetics and cell division which are identified as some topics in Biology curriculum that have been effectively taught with the use of Jigsaw game, puzzles and card games at secondary school level which allow learners to learn with ease and interest thereby assisting them to clearly understand how the process takes place and avoid misconception.

(ii) Biology teachers should endeavor to give brief explanation of the topic and the best way of playing the game before the learners begin. This is done to create a level playground for all players to enhance their effective participation.

(iii) Students should be grouped into smaller numbers to reduce unnecessary noise among the crowded members in the group. This will enable the teacher to have proper control of each group and the class in general.

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SOCIAL MEDIA: A VERITABLE TOOL FOR ENHANCING EFFECTIVE TEACHING AND LEARNING OF ACCOUNTING KADUNA POLYTECHNIC, KADUNA STATE

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Abstract
This study examined social media: a veritable tool for enhancing effective teaching and learning of accounting in Kaduna Polytechnic, Kaduna State. Three research questions were raised. The study adopted the Survey research design involving the collection of data from accounting students and lecturers. The population of the study consisted of 281 respondents which are made of 20 lecturer and 147 Higher National Diploma (HND) II, 114 National Diploma ND II(regular students) of Kaduna Polytechnic. The sample size consisted of 281-respondents, which are made up of 20 lecturers and 261 students selected using systematic random sampling techniques. The study employed a primary source of data through administration of structured questionnaire to gather data from respondents. The data collected for the study was organized and analyzed on the basis of the research questions. Decisions on the research questions were based on the resulting means score interpreted relative to the concept of real lower and upper limits of numbers. Percentage % was used to determine level in which social media can enhance teaching and learning. Conclusion is drawn and recommendations made that; Accounting students should be encouraged to fully utilize social media such as Google, Facebook, WhatsApp to enhance effective learning of the course. Accounting educators should fully abreast themselves and fully implement the use of social media such as Google, Email, Facebook, Skype, etc in delivering their courses to students for enhanced teaching.

Key Words: Accounting, Effective Teaching, Social Media, Learning.

Introduction

Social media network is a social forum where interaction takes place among people in which they create, share or exchange information and ideas in virtual communities and networks. Reuben, (2014) defined social media as "a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0 and that allow the creation and exchange of user-generated content. Furthermore, internet has helped in the fostering of the interaction via the web. The use of Social Media has developed into a major strategy for organizations and the educational system for the purposes of Public Relations and in facilitating teaching/learning. Vervaart (2014) deposed that, since the development of Web 2.0 there has been a massive increase in web based traffic which could be loosely called 'social networking' which initially was mainly networking between individuals but more recently has developed into a major marketing resource allowing networking between organizations and individuals on the web. In that note, social Media Networks are growing and it's been reaching to large people day by day (Zolkos, 2012).

The Social Media is popular now because the availability of the internet and also the technologies which help to make this availability to our hands like Mobiles, Tablets. The uses of educational technology in the technologically developed countries have shown to be important because of the pace at which technology vis-à-vis social media is being incorporated into academic curricula. Social media are now most often used to supplement traditional face to face classroom activities, commonly known as blended learning. E-learning supports both the learner and the education in a number of ways, for example, differing learning styles can be catered

for, which help educators reach more students in varied ways, and enable more students to learn the course material. The emergence of social media has forced educators to think differently about the way learning occurs. Students and practitioners alike are using new technologies to connect with peers/colleagues, share ideas, resources and experiences for extracurricular activities (Zolkos, 2012).

The development and expansion of a social media has been a dominant trend in teaching and learning environments for over a decade. This technological breakthrough was strategically designed to support teaching and learning, and has attracted much scholarly attention in several journals (Wagner, 2011). For several years, electronic social media have facilitated teaching and learning and have also increased the level of faculty and student enthusiasm in learning activities which includes the Accounting programme (Weber, 2012). There are positive correlation between social media and students' enduring interest in knowledge acquisition (Rasiah, 2014).

Accounting is a systematic and organized programme of instrument aimed at transmitting accounting knowledge, skills, ideas, aptitude and technical know-how to recipients which is required for usage in offices and for teaching others. Accounting as a discipline is expected to expose its recipients to full range of curricula that provide the skills, hence, it is that type of education that inculcates in its recipients attitudes, knowledge. Accounting as a profession has a very important role to play in the economic development of any nation. As a measurement and reporting information system, the profession can cover both micro and macro-economic activities. It consists of various subsystems with related economic events and decisions (Ajayi, 1997). These subsystems which can be identified as the major accounting fields include; business accounting, government accounting, social accounting, auditing and taxation, all of which aid in economic planning, project appraisal, capital formation and so on, skills, values that are required in the world of work (Salome, 2012). Consequently, it is very imperative for the accounting programme to leverage on social media (Google, facebook, YouTube, twitter, Skype, etc.) as a veritable tool to enhance her teaching and learning of the course (Thomas & Thomas, 2012).

Different social activities have different functional traits: identity, conversations, sharing, presence, relationships, reputation and groups. Specific social media sites can possess different traits (YouTube is mainly about sharing, but as important are the conversations and presence). According to these properties, it can be shown how social media and its respective qualities can be used for improving teaching and learning experience (See Table 1).

Table 1: Social media functions for improving teaching and learning experience

Functional trait:	**Improving teaching experience:**	**Improving learning experience:**
Identity	To develop the identity of the subject To develop teachers identity and share it with the students To understand student identities	The understanding of the subject is established Helps to develop students identity and share it with the teacher and other students To understand teacher identity
Conversations	Having two-way communication Getting feedback	Having two-way communication Getting feedback
Sharing	Sharing information with all students at the same time	Sharing information with teacher or other students at the same

	Sharing different type content (text, images, video, audio, games)	time Sharing different type content (text, images, video, audio, games)
Presence	Can give and answer questions at any time, distribute various tasks.	Can give and answer questions at any time, perform tasks from distant locations.
Relationships	Building relationships	Building relationships
Reputation	Transparency	Transparency
Groups	Communication with students over distance. Communication with smaller student groups.	Communication with other students and teachers over distance. Work in smaller groups, with easier scheduling.

Source: Dovile, (2015)

Social media comprises of activities that involve socializing and networking online through written and spoken words, pictures and videos. Social media is redefining how we relate to each other as humans and how we as humans relate the organizations that serve us. It is about dialog – two way discussions bringing people together to discover and share information (Solis 2008). Social media allows individuals to share ideas, interests and also meet people with similar and opposite ideas and interests. Some of the social media used in education for effective teaching and learning according to Reuben (2014) includes:

(i) **Skype:** is a social media application that provides the opportunity for video chat and voice call between electronic device users. It supports conference calls.

(ii) **Google+:** this provides search engine for users to search for information and data of any kinds and fields

(iii) **Facebook:** Is a social forum that connects people with friends and others who work, study and live around them. People use Facebook to keep up with friends, upload an unlimited number of photos share links and videos, and learn more about the people they meet.

(iv) **YouTube:** Is the leader in online video, and the premier destination to watch and share original videos worldwide through the Web. It allows people to easily upload and share video clips across the Internet through Web sites, mobile devices, blogs, and e-mail.

(v) **Blogs:** Are a form of online journal. They can have a single author, or several. Most blogs allow readers to post comments in response to an article or post. The most popular use of blogs in higher education is having currently enrolled student's blog about their lives on campus, as a recruiting initiative in conjunction with admissions. Blogs are also being used by some colleges to post news articles to open conversations about them.

(vi) **Twitter:** Is a cross between instant messaging and blogging that allows users to send short (140-character) updates. Users can also follow the updates of friends they "follow", send them direct messages, and reply publicly to friends, or just post questions or comments as their current status.

Social media provides new opportunities for innovating and modernizing education and training institutions and for preparing learners for the 21st century (Redecker, Ala-Mukta, Bacigalupo, Ferrari, & Punie, 2009). Furthermore, social media technologies have the potential to support and enhance teaching and learning in higher education providing learners with a chance to manipulate their learning environment and to participate actively in the learning process. Up to

recently, Web 2.0 technologies have largely applied only in a social sphere; however a growing number of businesses are adopting enterprise social software technologies. It is through these collaborative technologies that students and knowledge workers will gain enhance insight in the knowledge at their disposal. These tools will also enable information workers to locate and connect people with certain expertise across organizations, bringing people, systems and data into alignment faster to respond to challenges and take advantage of competitive opportunities. In an educational context Chen and Bryer (2012) stated that publicly open social media sites provide students with access to more information and experiences than they would get in a closed environment alone. If properly facilitated and framed, such expanded exposures can benefit student learning by creating more connections across boundaries and over time. The use of social media technology is a means of skilling students in preparation for the 'real world in order to be able to cope with many authentic challenges (Wagner, 2011).

Statement of the Problem

A shift is occurring in education whereby the learning environment is be-coming decentralized moving from instructor and institution to one where students direct their own learning, find their own information, and create knowledge by engaging in networks away from the formal setting that is ripe for social media learning (Dovile, 2015). The current generation of students entering higher education is digital natives who have been raised in a techno-centric world where omnipresent technologies play an integral role in human life and where new innovations are quickly absorbed and assimilated. In order to develop learning communities with increased student engagement, educators are increasingly adopting the use of social networks to supplement teaching and learning in both fully online as well as traditional classroom learning environments. Empowered by technology, the current generation of students yearns for new means for self-expression and information sharing. Educators seek ways to bridge the perceived technological chasm between tutor and tutee (Wagner, 2011). The extent to which this chasm actually exists and the role of social media technologies as part of a possible solution remain under exploration. Social media and the educational system are two sides of coin that cannot be divorced because of the functions social media play in the educational sector, which can no longer be undermined. These gave rise to the researcher to explore the extent to which social media is used for teaching and learning Accounting in Kaduna polytechnics

Purpose of the Study

The purpose of this study was to determine the extent of utilization of social media as a veritable tool for enhancing effective teaching and learning of accounting Kaduna Polytechnic, Kaduna State Specifically the objectives is to determine:

(i) the extent to which social media is used for teaching Accounting in Kaduna polytechnics.
(ii) the extent to which social media is used for learning Accounting in Kaduna polytechnics.
(iii) the level which social media can enhance teaching and learning of Accounting in Kaduna polytechnics

Research Questions

The following research questions were raised for the study:

(i) To what extent is social media used for teaching Accounting in Kaduna polytechnics?
(ii) To what extent is social media used for learning Accounting in Kaduna polytechnics?
(iii) At what level social media can enhance teaching and learning of Accounting in Kaduna polytechnics?

Design of the Study

The descriptive survey design was used for the study. This design was adopted to elicit status quo information from accounting lecturers and students on social media as a veritable tool for enhancing effective teaching and learning of accounting in Kaduna Polytechnic.

Population of the Study

The population of the study consist of 281 respondents which are made of 20 lecturers and 147 HNDII, 114 NDII (regular student) of Kaduna Polytechnic. As contained in Table 2 below.

Table 2: Population of the Study

S/N	Respondents	No. of Respondents
1.	Lecturers	20
2.	HNDII Students	147
3.	ND Students	114
	Total	**281**

Source: Field Survey, 2018

Sample and Sampling Techniques

The sample size consisted of 281-respondents, which are made up of 20 lecturer and 261 students selected. The fifty percent (50%) of lecturers in the population were used while fifty percent (50%) of the students were used.

However, the researcher adopted the systematic random sampling technique to arrive at the sample size. The sample size is shown in Table 3 below.

Table 3: Sample of the Study

S/N	Respondents	No. of Respondents
1.	Lecturers	10
2.	HNDII	74
3.	NDI	57
	Total	**141**

Source: Field Survey, 2018

Method of Data Collection

The study employed a primary source of data through administration of structured questionnaire to gather data from respondents. The data collected for the study was organized and analyzed on the basis of the research questions. Decisions on the research questions were based on the resulting means score interpreted relative to the concept of real lower and upper limits of numbers as shown in Table 4. Percentage % of 70 – 100; 60-69; 50-59; 40-49 and 0-39 signified Highly Enhance, Moderately Enhance, Slightly Enhance and Not Enhance respectively was used to determine level in which social media can enhance teaching and learning.

Table 4: Interpretation of Four Point Scale

S/N	Point	Scale
1	3.50-4.00	High Extent
2	2.50-3.49	Medium Extent
3	1.50-2.49	Low Extent
4	0.50-1.49	Not Utilized

Presentation and Analysis of Data

The presentation below is the responses from the questionnaires returned. The responses are presented according to the following:

To what extent is social media used for teaching Accounting in Kaduna polytechnics?

Table 5: data presentation and analysis

S/N	Social Media Network	Mean	Remark
1	Google	2.45	Low Extent
2	WhatsApp	2.01	Low Extent
3	YouTube	2.23	Low Extent
4	Twitter	1.46	Not Utilized
5	Email	2.51	Medium Extent
6	Facebook	2.06	Low Extent
7	LinkedIn	1.32	Not Utilized
8	Skype	1.41	Not Utilized

Source: Field Survey, 2018

The data in Table 5 revealed that Twitter, LinkedIn and Skype were not used for teaching Accounting, Google and YouTube WhatsApp and Facebook were used at low extent and email was used at medium extent.

To what extent is social media used for learning Accounting in Kaduna polytechnics?

Table 6: data presentation and analysis

S/N	Social Media Network	Mean	Remark
1	Google	3.75	High Extent
2	WhatsApp	2.91	Medium Extent
3	YouTube	2.33	Low Extent
4	Twitter	1.32	Not Utilized
5	Email	2.59	Medium Extent
6	Facebook	2.06	Low Extent
7	LinkedIn	143	Not Utilized
8	Skype	1.23	Not Utilized

The data in Table 6 revealed that Twitter, LinkedIn and Skype were not used by students for learning Accounting. Google was used by students at high extent. WhatsApp and Email were used at medium extent, while YouTube and Facebook were used at low extent.

At what level social media can enhance teaching and learning of Accounting in Kaduna polytechnics?

Table 7: Lecturers and Students Responses

S/N	Social Media Network	Lecturers	Students	Average %	Remark
1	Google	75%	88%	81.5	Highly Enhanced
2	WhatsApp	69%	83%	76	Highly Enhanced
3	YouTube	65%	79%	72	Highly Enhanced
4	Twitter	72%	79%	75.5	Highly Enhanced
5	Email	71%	76%	73.5	Highly Enhanced
6	Facebook	86%	75%	80.5	Highly Enhanced
7	LinkedIn	79%	70%	74.5	Highly Enhanced
8	Skype	80%	81%	80.5	Highly Enhanced

Table 7: Revealed the percentage of ranging from 72% to 81.5% meaning that the level in which social media can enhance teaching and learning is high.

Discussions of Findings

The study focused on social media: a veritable tool for enhancing effective teaching and learning of accounting. The study revealed that social media serves as a veritable tool to a high extent for enhancing effective teaching of accounting. The findings of this study, collaborates the views of Rasiah, (2014) whom purported that social media supports and enhances teaching in higher education providing learners with a chance to manipulate their learning environment and to participate actively in the learning process.

Also, it was found out that social media serves as a veritable tool to a high extent for enhancing effective learning of accounting. Rasiah, (2014).deposed that the impact of social media on the learning process is widespread and strongly supported. The strength of social media applications is that they offer an assortment of tools that learners can mix and match to best suit their individual learning styles and increase their academic success. Furthermore, such technologies are typically freely accessible, easy to incorporate, and have a minimal learning curve to master. Learning environments can become personalized, and faculty can enhance their pedagogical techniques by using tools to extend class engagement beyond designated class time and to increase the quality and quantity of participation in online courses. Facebook and Twitter can improve interaction among learners and teachers. Teachers can respond to students' questions via a Facebook page or Twitter feed, post homework assignments and lesson plans, send messages and updates, schedule or announce upcoming events, and share interesting Web sites and multimedia content. Students can use Twitter to get help from teachers or other students. A great way for teachers to give participation points in addition to in class participation is by having students tweet about something that was discussed in class.

More so, it was discovered that there is a positive relationship between social media and the teaching and learning of accounting. Some studies (Weber, 2012) indicate positive correlation between social media and students' enduring interest in knowledge acquisition. Therefore, it is not surprising that social networking sites have increasingly sustained and improved the methodology of interactions in academic and professional settings.

Conclusion

Unarguably social media has become effective tools in teaching and learning process, increasingly improving the quality of students' learning outcomes, encourages active engagement, collaboration, and participation in class activities and group work and provides a flow of information dissemination in different method that yields positive results. Therefore, the accounting programme has to embrace social media as a veritable tool for enhancing effective teaching and learning of the course.

Recommendations

The following recommendations were made for the study:

(i) Accounting students should be encouraged to fully utilize social media such as Google, Facebook, Whatsapp, etc to enhance effective learning of the course.

(ii) Accounting educators should fully abreast themselves and fully implement the use of social media such as Google, Email, Facebook, Skype, etc in delivering their courses to students for enhanced teaching.

(iii) Tertiary institutions should create the enabling environment and as well provide the necessary facilities to engender the effective utilization of social media for enhancing

teaching and learning. Such as; providing free internet access for the lecturers and the students, uninterrupted power supply (therefore there should be a standing power generator).

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EFFECT OF PROJECT-BASED LEARNING ON THE ACHIVEMENT OF SECONDARY SCHOOL STUDENTS IN BASIC TECHNOLOGY IN NEW-BUSSA, NIGER STATE

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Abstract

This study investigated effect of project-based learning on the achievement on junior school students in Basic Technology in New-Bussa, Niger State Nigeria. The researcher used quasi experimental design involving pretest and posttest for the study. The study have three obectives, four research questions and four null hypotheses. Thirty three junior secondary school class two participated in in the pilot study. The population of the study is all government junior secondary two [JS 2] students in New-Bussa educational zone, involving 16 junior secondary schools running Basic Technology Programme with the population of 3,597 boys, 2,330 girls, and a total of 5,927 students in the study area. Two groups of the subjects were randomly selected as sample for experimental and control groups by using simple random sampling technique with the total of 154 students. Two instruments; Basic Technology Achievement Test (BTAT) and Students' Interest Questionnaire (SIQ) were used for data collection. The instruments were validated by experts. The reliability coefficient of 0.87 was obtained. The instruments were administered to the subjects before and after the treatment. The data collected was analysed at p 0.05 level of significance. The independent t-test simple statistics and paired sample t-test statistics were used for testing the hypotheses. Stakeholders, especially commissioners for education, directors of schools, principals and other resource personnel should always emphasize on the use of project-based learning for instruction in the class especially the teachers in the service. Students develop high interest in learning of Basic Technology Concepts learning Strategy is used in teaching learning and teaching. Teachers of Basic Technology in New-Bussa local government in Niger State should be encouraged to adopt project based learning to increase their knowledge on project-based learning strategy at JSS two level in junior secondary schools.

Keywords: Project based Learning, Achievement Basic, Technology.

Introduction

The system of education which Nigeria inherited from the colonial administration had some defects in terms of its contents and philosophy, with respect to the needs of the country (Obodo, 2014). The defects manifested in the inability of the educational system to meet the manpower needs of the fast growing Nigerian economy. This led to policy changes that brought about the National Policy on Education and its consequent changes in the Nigerian system of education.

Basic Technology, formerly known as Introductory Technology was structured to assist learners to develop interest in technology. The aim is that by the end of the junior secondary school, presently known as basic 9, technological appreciation would have been activated and sustained, and foundation laid for students' entrance into a vocation of their choice.

Furthermore, the national curriculum maintains that, the subject of Basic Technology is to be offered in junior secondary schools so as to reduce widespread ignorance about technology, lay a firm foundation for national development and inspire an increase in skill acquisition.

Basic Technology is a subject that introduces students at the junior secondary level of education in Nigeria, to the fundamental tips in technology. The National Policy on Education (NPE: 2013) defines Basic Technology as the aspect of education which leads to acquisition of practical and applied skills as well as basic scientific knowledge. It is also a subject that deals with the fundamentals of engineering and technology. In order to reduce ignorance in relation to technology and help lay a solid foundation for true national development, Basic Technology has been accorded a place in the school curriculum as a core subject like English and Mathematics. The objectives of teaching Basic Technology subjects in Nigerian schools include:

(i) To provide pre-vocational orientation for further training in technology.
(ii) 2.To provide basic vocational literacy for everyday living, and
(iii) To stimulate creativity (NPE,2013).

Looking critically at the objectives and the vital role of Basic Technology in the development of a nation, one would observe that it would be impossible to teach and learn Basic Technology effectively without first identifying and addressing the challenges inherent in its teaching and learning. It would require an enquiry into the availability of teachers, standard workshop, equipment and other tools to carry out practical activities in the schools.

The Federal Government in November, 2007 launched a new curriculum known as the new basic education curriculum for primary and junior secondary schools. The new curriculum is said to address, among other things, issues of value re-orientation, poverty eradication, critical thinking, entrepreneurship and life skills. Anowal, Chukwuka, Ezenwugo & Obienyem (2016) stated that in the Nigerian education continuum, basic education as the foundation requires a sound knowledge of science and technology. This is not only because science and technology has a tremendous impact on all social institutions but because science teaching is "somewhat on the downside in primary schools. The 9 years Basic Science and Technology Curriculum is therefore a restructuring and re-engineering of the revised core curriculum for Primary science and integrated science of Junior Secondary school currently in use.

The traditional method of teaching and learning is the popular methods of teaching in Nigerian school. This methods has been identified as being ineffective and as one of the factors responsible for the poor achievement of students in basic technology (Gates, 2011).

Achievement is the measurement of the effect of specific programme of instruction or training. These poor achievement of students could lead to lack of interest on the part of the learners. Interest is an important variable in learning because when one becomes interested in an activity one is likely to be more deeply involved in that activity. Interest is a subjective feeling of concentration or curiosity over something (Obodo, 2014).

Project Based-Learning is a learner-centered pedagogical approach that affords learners (including prospective and certified teachers) opportunities to engage in goal-directed inquiry. Learners work collaboratively with others as they analyze complex and ill-defined projects (Bimbola & Daniel, 2010). Learners also work independently to collect information they then bring back to the group as they resume their collective project solving and subsequent reflection on both the issue at hand and the group's functioning. The teacher's role changes

from one of primarily "telling" information to one that facilitates thinking, reflecting, and collaborative inquiry, while content decisions are left up to the students.

Thus, PBL's goals consist of conceptual and pedagogical content knowledge construction, collaboration, and self directed, lifelong learning. These goals are brought to fruition through learners' engagement in the PBL tutorial process and three of the process's features: the project-cases, learning issues, and the facilitator.

Results from previous researches on the teaching of Basic Technology revealed that teachers predominantly use demonstration method in basic technology lessons ((Lawan, 2011). This may suggest that teachers do not vary their teaching methods from time to time. It may also be suggested that activities carried out are not stimulating enough. Hence, the researcher wants to find out if project-based learning will have a significant impact in the achievement and interest of students in Basic Technology.

Statement of the Problem

Basic Technology studies in the junior secondary schools in Nigeria, is yet to reach its full potentials and engender full vocational competences among Nigerian youths. This is because basic Technology is confronted by myriads of projects such as which militate against its proper and efferent teaching in junior secondary schools. Specifically, the study sought to investigate the challenges confronting effective teaching and learning of Basic Technology in the junior secondary schools and the projects inherent in the need for proper implementation of the already reformed curriculum. It is the investigation of these identified projectatic issues that this study is intended to examine effect of project-based learning on the achievement of junior secondary school students in basic technology in New-Bussa, Niger State.

Purpose of the Study

(i) Determine the impact of project-based learning strategy on academic achievement of JSS students and those exposed to lecture method,
(ii) Investigate impact of project-based learning on male and female students in Basic Technology at JSS level,
(iii) Find out which of the two teaching strategies promotes interest in the learning of Basic Technology among Junior Secondary School students, find the difference in the interest of male and female students.

Research Questions:

The following research questions guided the study:

(i) What is the difference in academic achievement between students who are exposed to project-based learning and those that are exposed to lecture method in Basic Technology?
(ii) What is the difference between the mean score of male and female students who are exposed to project-based learning strategy at JSS level in Basic Technology?
(iii) What is the impact of the two teaching strategies on interest of JSS Basic Technology students?
(iv) What is the difference in the interest of male and female students in Basic Technology?

Null Hypotheses

The following research hypotheses guided the study:

H_{O1}: There is no significant difference between the mean achievement scores of students taught Basic Technology using project-based learning strategy and those taught with lecture method.

Ho_2: There is no significant difference between the mean scores of male and female students taught Basic Technology using project-based learning strategy.

Ho_3: There is no significant difference in the interest of Basic Technology students before and after exposure to lecture method.

Ho_4: There is no significant difference in the interest of male and female students in Basic Technology.

Methodology

This research study used quasi-experimental control group design involving pretest and posttest. The pretest and posttest were administered to the two groups (experimental and control). The pretest was administered to the subjects in order to determine their academic ability level before the treatment, while posttest was administered after the treatment. The experimental group was exposed to treatment using project-based learning techniques while the control group was exposed to lecture method . The population of the study is all government junior secondary two students in New-Bussa educational zone in Niger State. Four secondary schools were selected out of 16 schools from New-Bussa educational zone by using simple random technique involving balloting method The researcher used two instruments for the study. The instruments are Basic Technology Achievement Test (BTAT) and Students' Interest Questionnaire (SIQ). Basic Technology Achievement Test contains 30 multiple choice items while Students' Interest Questionnaire (SIQ) contains twenty (20) statements. The pilot study was conducted in G.S.S Kontagora. This school is outside the study area. The researchers sought permission from the principals of the selected schools to allow their schools to be used for the study. The researchers and the research assistants conducted the pre-test to both groups of students to determine their entry level and they were post-tested after they had undergone the treatment for six (6) weeks. After the treatment administration, the researcher and the research assistants conducted the test to the subjects.The data collected was analysed at p 0.05 level of significance. The independent t-test simple statistics and paired sample t-test statistics were used for testing the hypotheses.

Results

Data analysis

Research question 1: What is the difference in academic achievement between students who are exposed to project-based learning with those that are exposed to lecture method?

Table 1: The Mean Score of Students Exposed to Project-based learning and those Exposed to Lecture method Strategies.

Groups	N	Mean	Std. dev	Std.Err
G_1 Experimental (using project-based learning) 73	50	33.10	5.20	
G_2 Control (lecture method)	50	32.06	5.31.75	

Based on the results in Table 4:2:1 indicates that the mean achievement score of students in the experimental group was 33.10 and the mean achievement score of students in the control group was 32.06. Students in the experimental group have the mean achievement score of 1.04 higher than the control group. This shows that the students in the experimental group have higher mean achievement score of 1.04 than their control group counterparts. The standard deviation of the experimental group was 5.20 and that of control group was 5.31.

Research question 2: What is the difference between the mean score of male and female students who are exposed to project-based learning strategy at JSS level?

Table 2: Summary of Mean Scores of Male and Female Students Exposed to Project base learning.

Sex	N	Mean	Std.dev	Std.Err
Male	25	33.48	4.19	0.84
Female	25	32.72	6.11	1.22

The result in the Table 2 compared the mean achievement scores of male and female students exposed to project-based learning strategy in Basic Technology. Their mean scores were 33.48 and 32.72 for male and female students respectively. The male students have mean achievement score of 0.76 higher than their female counterparts in the same group, which means that the standard deviation of male students is closer to the main mean score than the standard deviation of their female counterparts in the same group.

Research question 3: What is the impact of project-based learning strategy on interest of JSS Basic Technology students?

Table 3: The Mean Difference of Impact of Project-based learning Strategy on Interest of JSS Basic Technology Students

Interest	N	Mean	Std.dev	Std. Err
Before exposure to project-based learning	50	55.82 2.61	18.47	
After exposure to project-based learning	50	64.60 2.11	14.93	

The result in the Table 4.2.3 reveals that there is difference between the mean scores on interest of JSS Basic Technology students before and after exposure to project-based learning. This is because the mean score of interest of students before exposure to project-based learning was 55.82 and it roused to 64.60 after exposure to the project-based learning strategy. The difference between the interests of students before and after exposure to project-based learning is 8.78. This indicates that students have developed interest in Basic Technology after the exposure to project-based learning Strategy.

Research question 4: What is the difference on the interest of male and female students in Basic Technology?

Table 4: The Difference in the Interests of Female Students taught via Project-based learningand those taught via lecture method.

Groups of female	N	Mean	Std.dev Std.Err
Project-based learning25	32.7	22.90	0.84
Lecture method21	33.38	4.20	0.63

The result in the Table4 indicates that female students in the first group taught Basic Technology using project-based learning had a mean score of 32.72 as compared to their counterparts in the second group who were taught Basic Technology using lecture method with a mean interest score of 33.38. This implies that the control group of female students had

higher mean interest scores of 0.661 higher than their experimental group counterparts, meaning that students taught by the lecture method had high interest score in the learning strategy than those taught by project-based learning.

Testing of Research Hypotheses

Hypothesis One (Ho_1): There is no significant difference between the mean achievement scores of students taught Basic Technology using project-based learning strategy and those taught with lecture method.

Table 5: Independent t-test sample statistic on the Difference between the Mean Achievement **Scores of Students Taught Basic Technology using Project-based learningstrategy and those taught with lecture method.**

Groups	N	Mean	Std.dev	Std.Err	df	t-cal.	t-critical	Sig (p)
Project-based learning	50	33.10	.	199	.735			
						98	0.99	
1.96	0.33							
Lecture method	50	32.06	5.31	.751				

Calculated t< 1.96, calculated p > 0.05

The result in Table 5 shows that t-cal (0.99) is less than t-critical (1.96) at df 98. Also, pvalue of 0.33 is greater than alpha level of significance($p \leq 0.05$). Based on these results in Table 4.3.1, the research Hypothesis One (1) which states that " There is no significant difference between the mean achievement scores of students taught Basic Technology using project-based learning strategy and those taught with lecture method strategy is therefore retained. while the t-calculated value of 0.99 is less than the t-critical value of 1.96 at df 98 and the mean achievement scores were 33.10 and 32.06.

Hypothesis Two ($H0_2$): There is no significant difference between the mean achievement scores of male and female students taught Basic Technology using Project-based learning strategy.

Table 6: Difference between the Mean Achievement Scores of Male and Female Students Taught Basic Technology Using Project-based learning Strategy.

Sex	N	Mean	Std.dev	Std.Err	df	t-cal	t- Cri.	Sig (p)
M	25	33.48	6.11092	1.22218				
					48	0.513	1.96	0.61 F
	25	32.72	4.18848					
.8377								

Calculated t< 1.96, calculated p > 0.05

The independent t-test statistics on Table 6 revealed that the calculated p value of 0.61 is greater than the alpha level of significance ($p \leq 0.05$) while the t-calculated value of 0.51 is less than the t-critical value of 1.96, at df 48. The mean achievement scores were 33.48 and 32.72 for male and female students respectively in the experimental group. The male mean achievement score was 0.76 higher than the female counterpart. This shows that there is significant difference between the mean achievement scores of male and female students taught Basic Technology using project-based learning strategy. This implies that the null HypothesisTwo ($H0_2$) which states that "There is no significant difference between the mean

achievement scores of male and female students taught Basic Technology using project-based learning techniques" is hereby rejected.

Hypothesis Three($H0_3$): There is no significant difference in the interest of Basic Technology Students before and after exposure to project-based learning.

Table 7: Paired Sample t-test statistic in the Difference on the Interest of Basic Technology Students before and after exposure to Project-based learning Strategy.

Interest (p)	N	Mean	Std.dev	Std. Err	Df	t cal.	t-critical	Sig
Before exposure	50	55.82	18.47	2.61				
					48	3.74	1.96	
0.00 After exposure		50	64.60	14.93	2.11			

Calculated t > 1.96, calculated p < 0.05

The result in the Table 7 indicates that the alpha level of significance *($p \leq 0.05$*) is greater than the calculated p-value of 0.00, while the t-calculated value of 3.74 is greater than the t critical value of 1.96 at df 48. The mean interest level scores were 55.82 and 64.60 before and after exposure to project-based learning strategy respectively. This implies that students' interest in Basic Technology is significantly higher after being exposed to project-based learning strategy. The null Hypothesis Three ($H0_3$)which states that "There is no significant difference in the interest of Basic Technology students before and after exposure to project-based learning strategy" is hereby rejected in favour of lecture method since the result of the paired sample t-test statistic revealed that there is significant difference in the interest of Basic Technology students before and after exposure to project-based learning strategy.

Hypothesis Four ($H0_4$): There is no significant difference in the interest of male and female students in Basic Technology with project-based learning.

Table 8: Independent t-test Sample Statistic on the Interest of Male and Female Students in Basic Technology.

Groups male & female	N	Mean	Std.dev	Std.Err	df	t cal.	t-cri.	Sig (p)
Project-based learning	M 25	32.72	4.19	.	84			
					44	0.61	1.96	0.54
Project-based learning	F	21	33.38	2.89	.	63		

Calculated t< 1.96, calculated p > 0.05

The result in the Table 8 shows that the calculated p-value is 0.54 is greater than the 0.05 alpha level of significance while the t-calculated value of 0.61 is less than the t-critical value of 1.96 at df 44. The mean scores on interest of male and female students in experimental group taught by project-based learning are 32.20 and 33.38 respectively. The null hypothesis four ($H0_4$) which states that "There is no significant difference on the interest of male and female students in Basic Technology taught project-based learning strategy is not accepted because the independent t-test statistics revealed that there is significant differences on the interest of male and female students taught Basic Technology using project-based learning strategy. Since the calculated p-value of 0.54 is greater than the 0.05 alpha level of significance and the t-calculated value of 0.61 is less than the t-critical value of 1.96, at df 44. Therefore, the null hypothesis which states that there is no significant difference in the interest of male and female students in Basic Technology is hereby rejected.

Discussion

The data collected for this study were based on the Basic Technology Academic Achievement test (BSAT) and responses obtained from the Students' Interest Questionnaire (SIQ). They were analysed in line with the focus of the research questions and research hypotheses which were formulated in the design of the study. According to the outcome from Table 1, the mean achievement scores of students in the experimental group were 33.10 as compared to those of control group with the mean score of 32.06. This shows that students in the experimental group (taught by project-based learning strategy) have the mean achievement scores of 1.04 higher than their control group counterparts (taught by lecture method).

The result in 2 indicates that the mean scores 33.48 and 32.72 for male and female students respectively. The male students have mean achievement score of 0.76 higher than their female counterparts in the same group.

The result in the Table 3 reveals that there is difference between the mean scores on interest of JSS Basic Technology students before and after exposure to project-based learning. This is because the mean score of interest of students before exposure to project-based learning was 55.82 and it rose to 64.60 after exposure to the project-based learning strategy, meaning that the change in interest after the exposure to the project-based learning strategy was 8.78.

The result in the Table 4 indicates that female students in the first group taught Basic Technology using project-based learning had a mean score of 32.72 as compared to their counterparts in the second group who were taught Basic Technology using lecture method with a mean interest score of 33.38. This implies that the control group of female students had higher mean interest scores of 0.661 higher than their experimental group counterparts.

The result in Table 5 shows that t-cal (0.99) is less than t-critical (1.96) at df 98. Also, pvalue of 0.33 is greater than alpha level of significance *($p \leq 0.05$)*. Based on these results in Table 5 the research hypothesis one (1) which states that " There is no significant differences between the mean achievement scores of students taught Basic Technology using project-based learning strategy and those taught using lecture method strategy is therefore accepted. Since the calculated p-value of 0.33 is greater than the 0.05 alpha level of significance while the t-calculated value of 0.99 is less than the t-critical value of 1.96, at df 98.

The finding of this hypothesis is in agreement with what Aworanti (2010) who stated that the performance of junior secondary students in Mathematics was dependent on the method used and the teacher, which is also in conformity with the findings of Abiola (2011) whose finding revealed that project-based learning was effective in the learning of educational technology.

The independent t-test statistic on Table 6 revealed that the calculated p-value of 0.61 is greater than the alpha level of significance ($p \leq 0.05$) while the t-calculated value of 0.51 is less than the t-critical value of 1.96, at df 48. The mean achievement scores were 33.48 and 32.72 for male and female students respectively in the experimental group. This shows that there is significant difference between the mean achievement scores of male and female students taught Basic Technology using project-based learning strategy. It also agreed with Joel (2010) who opined that girls' performance in Basic Technology was poorer than that of boys, this is also supported by Melissa (2010). The null hypothesistwo ($H0_2$) which states that "There is no significant difference between the mean achievement scores of male and female students taught Basic Technology using teamteaching strategy" disagreed with the statement.

Table 7 indicates that the alpha level of significance *($p \leq 0.05$)* is greater than the calculated p-value of 0.00, while the t-calculated value of 3.74 is greater than the t-critical value of1.96, at df 48. The mean interest level scores were 55.82 and 64.60 before and after exposure to project-based learning strategy respectively. This implies that students' interest in Basic Technology is significantly higher after being exposed to project-based learning strategy. The null Hypothesis Three($H0_3$)which states that "There is no significant differences in the interest of Basic Technology students before and after exposure to project-based learning strategy" is hereby rejected since the result of the paired sample t-test statistic revealed that there is significant difference in the interest of Basic Technology students before and after exposure to project-based learning strategy as seen in Table 4.3.3.This result agreed with the finding of Atadoga & Onaolapo (2008) and Cartier and Stewart (2000) who carried out a study on Effect of Project-based learning on the Academic Achievement of Students in Introductory Technology.

Table 8 shows that the calculated p-value 0.54is greater than the 0.05 alpha level of significance and the t-calculated value of 0.61 is less than the t-critical value of 1.96, at df 44. The mean scores on interest of male and female students in the experimental group taught by project-based learning are 32.20 and 33.38 respectively. The null hypothesis four ($H0_4$) which states that "There is no significant difference in the interest of male and female students in Basic Technology taught by team teaching strategy disagreed with the statement because the independent t-test statistics revealed that there is significant difference in the interest of male and female students taught Basic Technology using project-based learning strategy. Since the calculated p-value of 0.54 is greater than the 0.05 alpha level of significance and the t-calculated value of 0.61 is less than the t-critical value of 1.96, at df 44. Therefore, the null hypothesis which states that there is no significant difference in the interest of male and female students in Basic Technology is hereby retained. This findings supports Gates (2011) and Harbor-Peters (2005) findings which showed that girls found Basic Technology difficult, experienced greater anxiety and hated the subject more than boys did.

Conclusion

The following conclusions are made based on the findings of the study:
Project-based learning encourages corporation, share ideas, patience and tolerance and encourages unity, friendship, cohesion interaction and sociable among teachers. The cooperation of students observed amongst the team teachers serves as a model for teaching students positive teamwork skills and attitudes.

Students develop high interest in learning of Basic Technology Concepts when Project-based learning strategy is used in learning and teaching.

Project-based learning increases positive attitude charge among both teachers and students as they discuss issues together and lead to their creativity among others and learning.

Recommendations

Based on the findings of this study, the following recommendations are made:

(i) Teachers of Basic Technology should be encouraged by the school management to attend seminars, workshops and conferences during long vocation to adopt how to use project-based learning strategy or update them with the knowledge on project-based learning strategy.

(ii) Stakeholders, especially commissioners for education, directors of schools, principals and other resource personnel should always emphasize on the use of project-based learning for instruction in the class especially the teachers in the service.

(iii) Teachers of Basic Technology in New-Bussa local government in Niger State should be encouraged to adopt project based learning to increase their knowledge on project-based learning strategy at JSS two (2) level in secondary schools.

(iv) Teachers and students should be encouraged to solve class project so that the spirit of project based learning will be developed among students.

(v) More emphasis should be placed on incorporating project-based learning into all courses in Basic Technology Education.

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DESIGN AND IMPLEMENTATION OF MOBILE LIBRARY SERVICE APPLICATION FOR FEDERAL UNIVERSITY OF TECHNOLOGY (FUT) MINNA, NIGERIA

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Abstract
This study focussed on the design and implementation of a mobile library services application for University Library, Federal University of Technology (FUT), Minna, Nigeria. The mobile library services is a robust, user-friendly and portable Android application that enables library clientele to access library resources and services from remote locations more efficiently and conveniently using their mobile devices. Furthermore, the service of the application runs 24hours. Moreover, the programming language used for the design is Extensible Mark-up Language (XML) at the frontend and, Java & SQLite database at the backend. It also includes Universal Modelling Language diagrams intended to describe the functionalities and activities of the system. Preliminary investigation by the researchers revealed that FUT Minna library has the infrastructural requirement for implementing a mobile library services therein, hence, this research work will go a long way to trigger the initiation of a mobile library services in the library. Although there may be privacy/ownership challenges relating to copyrighted materials and online databases, the implementation of this mobile library services in FUT Minna library will improve services delivery and improve learning and research among students, faculty members and researchers respectively.

Keywords: Design; Implementation; Mobile Library Services; Federal University of Technology Minna.

Introduction

Libraries are knowledge institutions that acquire, process, store, manage and disseminate information resources in various formats and make them accessible to users. Libraries are known for provision of conducive environment and accommodation for learning, recreation and research to a wider range of users. Nowadays, efforts are geared towards re-designing and re-engineering libraries and their services in order to achieve a wider range of competitive goals needed in knowledge economy that is driven by technological innovations (Ayanbode,2011). Similarly, the British Library of Congress (2008) reported that the advent of the Internet and the ability to digitise large quantities of text, images and make them available over the web had transformed the ways libraries operate. In this digital age, the demand for access to information and knowledge is high, thus, libraries as facilitators of knowledge need to adapt to the paradigm shift in their services commensurate to the new trend. Furthermore, the digital age empowered by technology births modern library users seeking information in digital format.

The library is more than just the physical building that houses books and data, it represents a portal to world of knowledge and ideas. The library is a place where users come to discover big ideas and profound concepts that help push the frontiers of civilisation. In Nigeria, Womboh (2008) stated that the federal government has ICT plans and policies for the country that is yet to be implemented, emphasising on the relevance of ICT to effective modern library management and services. Similarly, Ajayi (2005) observed that any industry that side-lines ICT has simply signed a "death warrant" on its continued relevance. The library represents one area that has experienced this revolution. The fact that we live in knowledge based society with the need for universal access has made it necessary for the library to redefine its role and mode of service delivery. The traditional "brick and mortar" libraries need to give way to libraries that are not limited by geographical locations. Hence, it is imperative for libraries to reinvent themselves if they hope to develop and facilitate access to information in this digital age.

The mobile and wireless technologies have revolutionised the way clientele interact and communicate with the library, how they search for and access information resources and how they utilise the library as a place. Mobile library services allow the library clientele to: search the library catalogue and online databases, select library materials based on reviews and ratings by fellow clientele, view full-text of online articles and reserve print materials from remote locations. Furthermore, within the library building, mobile and Radio Frequency Identification (RFID) technology enable library clientele in locating reserved resources on the shelf, instantly provide access to extended information such as reviews and recommended readings on screen, and allow self-checkout of items at the shelf (Amanyi, Akor & Madu, 2018). In addition, the use of Global Positioning System (GPS) technology allows library clientele to identify friends or colleagues already in the library and join group study sessions. It should be added that, all of these services could be efficient and unmediated by library staff, allowing clientele to be independent, but could allow them to connect with library staff if assistance is required (Caruso& Kvavik, 2005).

The technology to enable many of these services are already available and libraries are beginning to produce catalogues, information retrieval tools, information literacy products, reference services and information resources which are mobile-ready. The application of mobile technologies greatly enhance service delivery by library staff, hence, responding to this could require service models which remove library staff from behind the desk, to becoming more visible and accessible in both the physical and digital world rather than roaming the library building, embedded in faculties and present in social media sites to response to users request.

Statement of the Problem

Preliminary investigation and literature consulted by the researchers revealed that the federal government of Nigeria through the National Universities Commission (NUC) had initiated various programmes designed to lunch Nigerian universities into information global society. Amongst these are automation of university libraries by means of Management Information Systems (MIS) in addition to Nigerian Universities Network (NUNET), which was aimed at initiating a viable local and Wide Area Network (WAN)in all universities (Nok, 2006). Nigeria virtual library initiative is another step by the federal government to provide access to relevant and current information resources in higher institutions (Fabunmi, 2009). Despite these efforts, many universities in Nigeria are yet to harness the opportunities availed by these initiatives, due to inadequate facilities, lack of maintenance of ICT equipment, lack of technical know-how and underutilisation of the facilities by the clientele owing to the complex/unfriendly interfaces, usability and portability failure of the system. Corroborating this assertion, Abdullah and Gibb (2006) noted that most library clientele were unaware of the existence of e-books and other

electronic information resources and services in the library and that they were willing to discover and use them more effectively.

It is against this backdrop that the researchers deem it fit to design and implement a mobile library service application using Federal University of Technology Minna Library as a case study. Moreover, the mobile library service application is delivered through a mobile application. It is user-friendly and portable to enable the library users access the library services from remote locations.

Objectives of the Study

The main objective of the study was to design and implement a mobile application for delivering mobile library services for clienteles in Federal University of Technology Minna. However, the specific objectives of the study were to:

(i) Analyse and determine the considerations for designing and implementing a mobile library service application in Federal University of Technology, Minna.
(ii) Ascertain the infrastructural requirement for implementing a mobile library service application in Federal University of Technology, Minna.
(iii) Design a mobile library application for delivering mobile library service application for clientele in Federal University of Technology, Minna.

Significance of the Study

This research work would be of great benefit to the library clientele (students, faculty members and research) and library staff. To the library clienteles, the designed mobile application will facilitate their access to current library resources and services from remote locations. It will save them the time and cost to visit the library building in order to access electronic resources and services. In addition, library users would obtain from the mobile library services include: 24 hours accessibility, usable, flexible and user friendly interfaces, portability and mobility advantage. Furthermore, the mobile library services will automate some routine activities carried out by the library staff, thus, it will facilitate the delivery of library services more efficiently and effectively.

Literature Review

According to Bryan-Low and Delaney (2006), in the early 1990s, the library was the major source of information embodied in books and journals, which were often outdated. Other complemented sources were lecture notes, photocopied materials, seminars, and conference papers. With the advent of Information and Communication Technology (ICT) infrastructure such as the Internet, e-mails, and the Global System for Mobile Communications (GSM), librarians, lecturers, students, researchers, and non-academic staff no longer have to travel far to retrieve information and neither do they rely on print materials only (Audu, 2006). The sharing of knowledge among students and lecturers has been made possible through these technologies. A novel approach to Internet connectivity has been launched with hundreds of thousands of persons (literate and non-literate) now accessing the Internet with WAP-enabled cell phones, smartphones and PCs using their phones as a modem. Presently, existing GSM networks offers GPRS services with introduction of 3G/UMTS.

Furthermore, Prensky (2006) asserted that not only can mobile devices be used for making call, some researchers believed that mobile devices have potential to assist in the learning process. Researches have revealed that one of the most important tools for the 21st century students is not the computer, but the mobile devices. The mobile devices have enormous capabilities: voice, text messaging, graphics, browsers, camera functions, geo-positioning, sensors, plug-in

screens, headphones, fingerprint readers, voice recognition, portability and mobility. Mobile devices could replace textbooks in future and with the limited screen size, publishers will reformat information for maximum effectiveness rather than just added pages. In Europe, China, Japan, and the Philippines, the public is already using mobile phones as learning tools. The world's largest Internet search firms – Google, Yahoo, and Microsoft have enabled their search engines and logos to pop-up on cell phone screens, enabling people to use their phones for other services the companies provide. Even though not all individuals use their phones to search for information online, there is a huge potential market with twice as many cell phones in use globally as PCs (Bryan-Low & Delaney, 2006).

Consequently, many companies are building mobile-enable web sites making it easier for mobile phones users to utilise. Adegboji and Toyo (2006) carried out a study on the impact of Internet on research recounted that the Internet contributes significantly to the ease of research through downloading of information materials. It is universally assumed in Nigeria, that both researchers and students in higher institutions are faced with the problem of insufficient as well as out-of-date information resource materials. In addition, Kamba (2008) reported that the only way to pursue knowledge is through research and the Internet is having a profound impact on the research process and dissemination of information. Audu (2006) citing Ojedekun (2001) maintained that the Internet has many benefits in the academic environment as it provides a round the clock access to global sources of information. It also gives researchers the ability to discuss and share experience with colleagues.

Moreover, Oketunji (2001) outlined areas in which the Internet can be used for effective and efficient service delivery. These include: education, library, office automation, health, security, agriculture, politics, commerce and engineering among others. Similarly, Lancaster and Sandore (1997) summarised the roles of the Internet in the provision of library services as:

"an electronic resource that is now having the most significant impact on library services, operations and on the professional activities of librarians. This significant impact on library is due to its multi-faceted nature as it simultaneously accomplishes three major important roles in library services, first of all, its resource can be accessed and used like any other reference tool. Secondly, it is dynamic, also far – reaching compared to any other resource used within the library setting. Thirdly, it serves as a medium of communication which has extended the possibility of librarians' interaction to users, colleagues and other professional activities beyond the physical library as well as relationships with library users".

The Internet and Information and Communication Technologies (ICTs) have revolutionised the concept of libraries; libraries are gradually becoming digitised and filled with electronic resources including comprehensive and open-sources scholarly resources.

Methodology

The designed mobile library services' application was accomplished using Android mobile technology. Moreover, Android mobile technology is the most widely used mobile tech in the world today. The programming language used for the design is Extensible Mark-up Language (XML) at the frontend and, Java & SQLite database at the backend. The frontend of the application includes the User Interfaces (IUs), which is the visible parts of the application which the library clientele are expected to interact with the system. The User Interface (UI) is made up of dialogue boxes, textboxes, forms, buttons, menus, images etc. The backend includes the programming logic responsible for the users request and processing such as handling user click events, submission or information retrieval from or to the database/server respectively. In the

implementation of this mobile library service application, the major software tools used for the development are Android Studio, Notepad+ and Adobe Fireworks for image/icon designs.

Modelling and Design of the Application

Universal Modelling Language (UML) was used to map out the layout and designs for the application. The UML diagrams describe the flow of data and processes that changes or transform data throughout the system. It presents a structured design and analysis tool which can be used for flowcharting instead of, or in connotation with information and process oriented system flowcharts. In the UML preparation, the analysts specify detail information of the users' needs at each level that will eventually determines the flow of information in, as well as out of the system.

Furthermore, Use-Case Universal Modelling Language (UML) diagram was used to describe the interaction between the user and the application. Use-Case diagram is a pattern of behavioural charts/diagrams that provides a visual image of the users' needs. It was used to capture the system's functionality and requirement specification. The Use-Case diagrams consist of functions, and the user/person or things invoking the functions (actions), and possibly the elements responsible for implementing the functions. Figure 1 below shows the Use-Case diagram of the application.

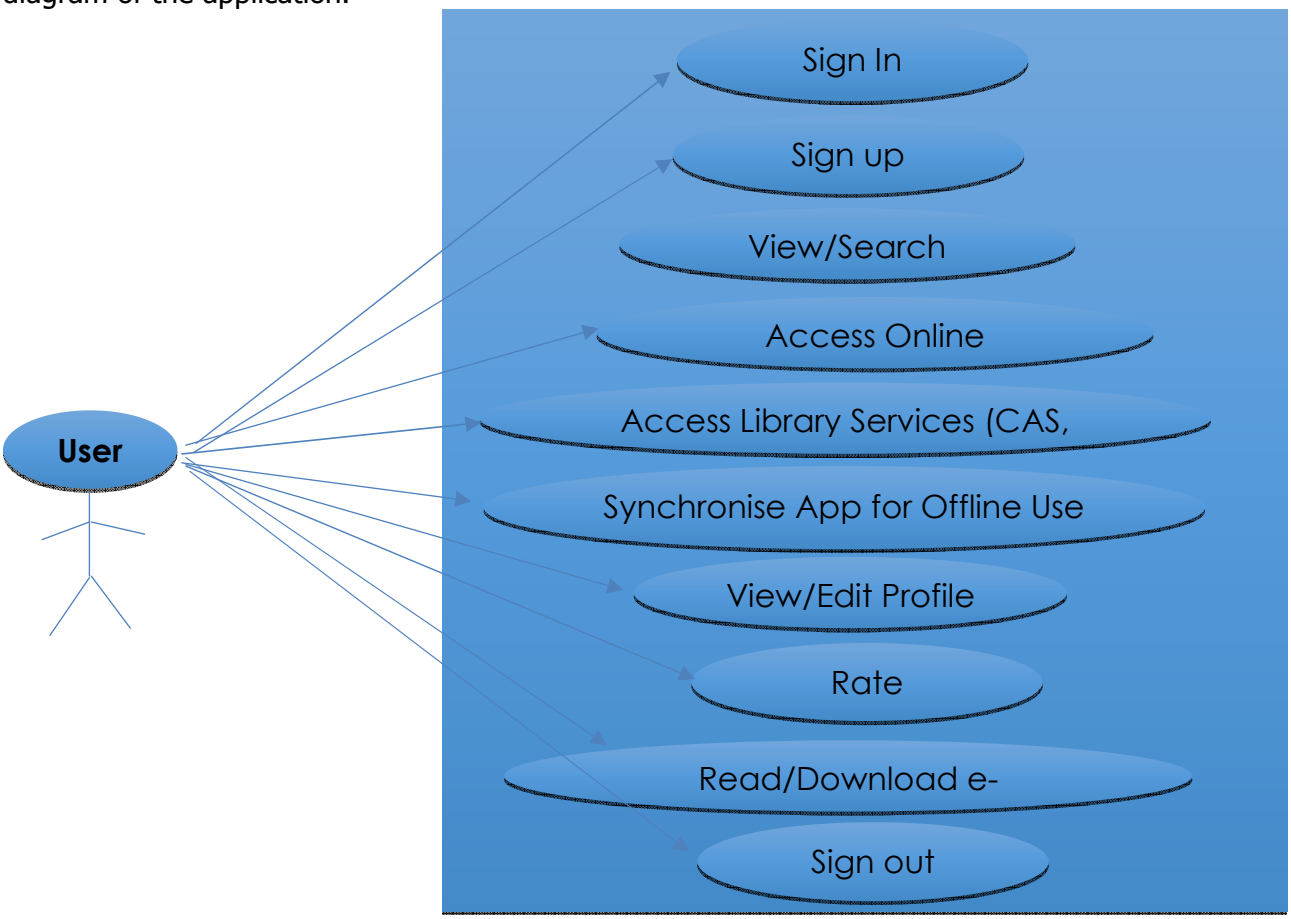


Figure 1. Use-Case Diagram of the Application

Designing an interface for mobile library services is a complex process that is oriented towards achieving the full capabilities of a system. A careful consideration of both system and user characteristics (functionalities, requirements and specifications) were key success for the effective design of the system. Thus, this design is based on the different user requirements

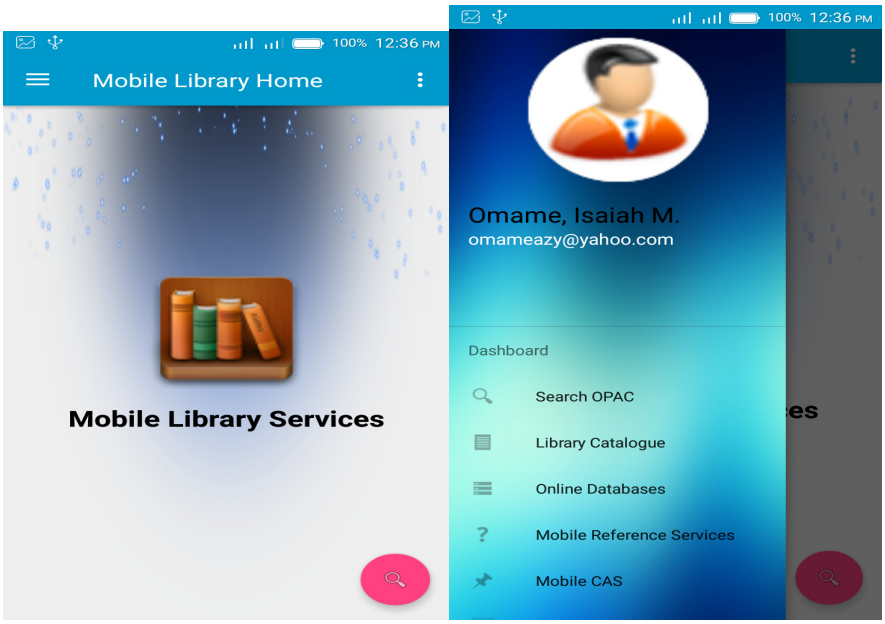
and technical feasibilities gathered for an effective and efficient user interaction and implementation.

Results and Discussion (Screen Shots)

The screenshots of the mobile library services' application is shown in Figure 2, 3, 4 and 5 below. A new user starts by registering in the application to create an account. On the registration form, the user will profile his/her personal details and login credential (email and password), thereafter the user can login and start using the application. It should be noted that when a user forgets his/her login credentials, the user can recover it via an e-mail service or phone number.

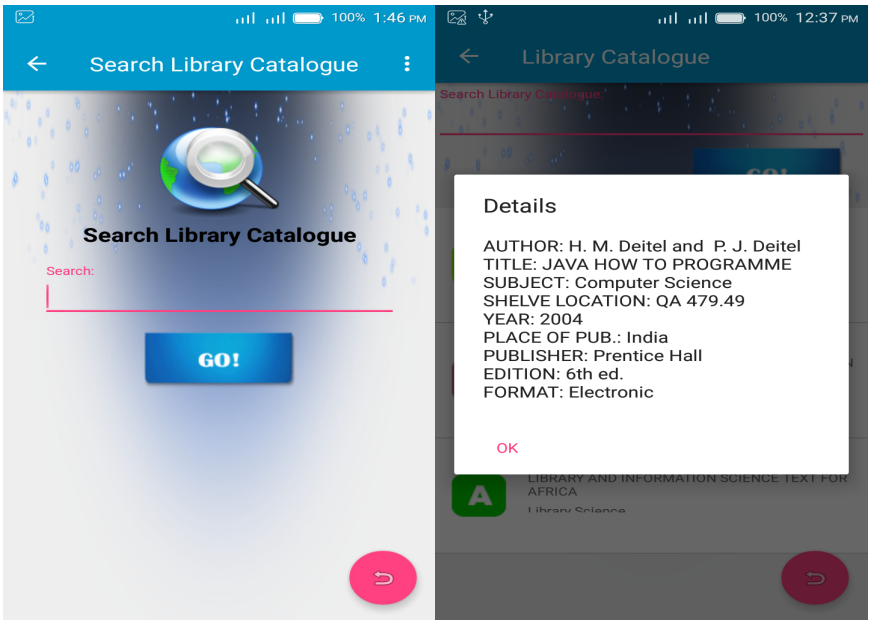
Sign In Page Signup Page

Figure 2: Sign in and Signup page



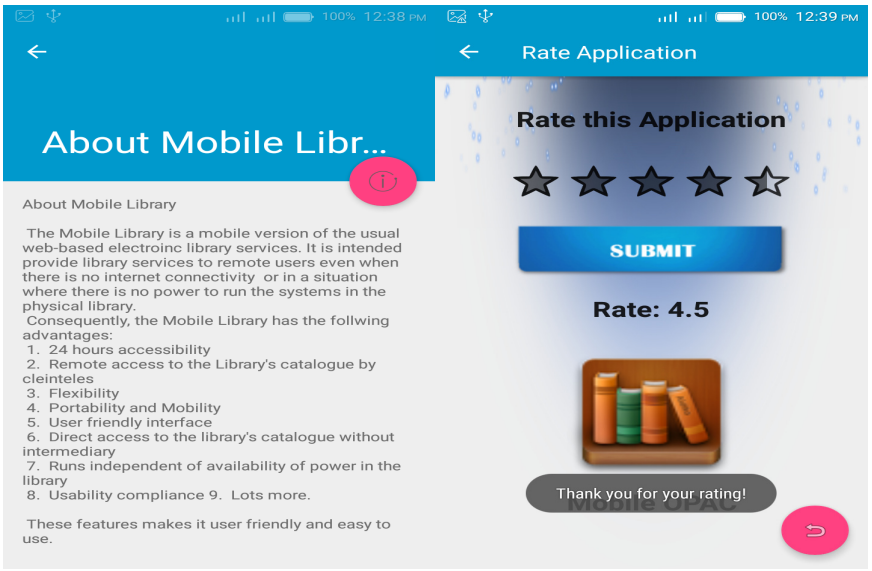
Home Page Main Menu

Figure 3: Home Page and Main Menu



OPAC Search Interface Bibliographic Information of Book

Figure 4: OPAC Search Interface and Book Description



AboutInterface Rate Application Interface

Figure 5: About and Rating Interface

Conclusion

Conclusively, the designed mobile library services' application is an Android based mobile software that delivers library services to the clienteles from remote locations. The preliminary investigation revealed that FUT Minna library does not have mobile library services for their clientele. However, the infrastructural requirement for implementing a mobile library services is available. Hence, this research work will go a long way to trigger the initiation of a mobile library services therein. Moreover, the library clientele and staff will be trained to use the application and in various ICT skill to keep abreast with the information needs of their clientele. Although the mobile library services has its own inherent challenges of physical access to print library materials and privacy/ownership issues relating to copyrighted materials, this study recommends collaboration between the library and publishers/ database vendors to address this. The implementation of this mobile library services in FUT Minna library will improve services delivery to the library clientele, and enhance library-to-user relationship. Finally, the mobile library services will improve learning and research among students, faculty members and researchers.

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AVAILABILITY AND EFFECTIVE USE OF INSTRUCTIONAL RESOURCES IN TEACHING AND LEARNING MATHEMATICS: A CASE STUDY OF SECONDARY SCHOOLS IN FCT

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Abstract
This research assessed the availability and effective use of Instructional Resources in secondary schools Federal Capital Territory (FCT) for enhancing the development of Mathematics in Federal Capital Territory. Mathematics instructional resources are of necessity to both mathematics teachers and students alike in teaching and learning activities. Its availability and effectiveness in teaching and learning mathematics cannot be overemphasized. The overall objective of the study is to find out if mathematics instructional resources are made available in FCT secondary Schools and to relating to the impact its usage has on the students' overall performance in mathematics. One hundred and fifty teachers selected randomly in selected secondary schools in Federal Capital Territory served as the samples for the research. A descriptive survey was adopted in the research. Both questionnaire and interview approach were used relevant statistical tools were equally used to interpret the information gathered. The result of the findings reveals the importance of providing and using the available mathematics instructional resources in the teaching and learning of mathematics and the apathy of user coupled with non-availability and non-usage are some of the obstacles to the teaching and learning of mathematics. Hence, relevant recommendation like the authority should direct teachers to effectively use instructional resources, adequate funding and regular training of teachers were suggested as the way out.

Introduction
The need for effective use of instructional resources in teaching and learning of Mathematics to bring about inclusive education cannot be over emphasized. Instructional resources are necessary tools needed for effective teaching and learning. Mathematics is a veritable tool in the development of science and technology. Hence, the need to make the teaching and learning of Mathematics exciting and concrete. Effective use of instructional resources is of great relevant in enhancing quality education (Salman, Ayinla, Adeniyi, Ogunlade & Ameen, 2012). Akanmu and Fajemidagba (2013) submitted that every individual irrespective of vocation, profession, background and race are involved in the use of mathematical knowledge on a daily basis either consciously or unconsciously. Adeneye, Awofala and Fatade, (2017) described Mathematics as the creation of human mind that involves the study of ideas and ability to conceptualise the totality of man's civilization from birth to death. The knowledge of education and particularly mathematics has facilitated the evolution of a global knowledge economy. Marise (2015) opined that instructional resources serve as a simple motivation not only for the students but also for the teachers in their learning process. Oforma (2005) sees instructional resources as facilitators of teaching and learning activities and consequently aide to the attainment of the lesson objectives.

Mathematics is a concept that deals with figures both numbers and non-numbers. Right application of instructional resources will make teaching and learning of mathematics more real

and practical in nature which will aid the learners' attention and participation. Kehinde (2018) opined that Nigerian government acknowledges that mathematics and mathematics education is a strong instrument for scientific, social and economic development. That is why mathematics is given all the necessary importance in school curriculum and policies related to education. Asebiomo (2014) described instructional resources as variety of communicating materials which is used to send out messages, ideas and experiences through active participation of the eyes, ears and hand. They are those ingredients/component that enhance the process of teaching and learning, which enables learners to comprehend what the teacher is trying to put across to them, more easily and more accurate. Haruna and Okeh (2011) revealed that the discovery and increased utilization of instructional resources in teaching is actually the greatest of all the advances in learning. Instructional resources illustrate the concept clearer and better than the teacher's words only.

Imogie (2002) stated that instructional resources they help to provide the teacher with a means of extending his students horizons of experiences Mathematical instructional resources are vital materials used by teachers to improve the effectiveness of instruction by appealing to a variety of the senses of students, thus enhancing maximization of learning. They represent the necessary resources available at the disposal of the teachers in passing information to learners as this helps to bring about a relatively permanent change in the behaviour of learners (Osunde and Bell-gram 2000). Instructional resources refer to tools and materials used in the teaching process to facilitate teaching and learning. Abdullahi (2008) sees instructional resources as tools and materials locally made or imported that could make a tremendous enhancement of lesson impact.

Learning of Mathematics depends largely on its method of presentation and the active interaction with the learning experiences on the part of the students. Instructional resources make teaching more effective. The use of resources that relates to knowledge and concepts acquisition (cognitive resources for knowing) rather than those that relate to learning matehmatics by doing (physical resources) that develops process, manipulate skills and facilitates the learners' concept of understanding (Abba, 2007). Instructional resources motivate students' interest and makes learning easier and more meaningful.

For any effective instruction to take place in teaching and learning of mathematics; the effective use of instructional resources must be taking serious. This is because the method of teaching and learning of mathematics is activity oriented i.e. (learning by doing) which can only be achieved by considering the types (varieties) quality, appropriateness and adequacy of these resources. Therefore, instructional resources can provide members of a group with a common or joint experience. They also break language barriers and ease difficulties and in the end make the lesson more meaningful. They save time and thus enable students grasp ideals more effectively and faster. Likewise, they help to simplify and emphasize facts and clarify difficulties (Jihat al-Islam 2013).

Wike (2012) appealed to state governments to commit sufficient resources to the development of quality local instructional resources in order to enhance qualitative education in the country. He made the appeal at the 2012 ceremony of the Network of Educational Services Centres in Nigeria (NESCN) organized by the Nigerian Educational Research and Development Council (NERDC) themed: building capacity of stakeholders on the development and use of instructional material resources.

Types of Instructional Resources

According to Ezeanya (2014), the main types of Instructional Resources are classified as follows:

(i) Real Objects (Realia)
(ii) Visual Resources (Projected, Non-Projected)
(iii) Audio Resources
(iv) Audio-Visual Resources
(v) Community-based Resources (Phenomenal)
(vi) Resources for Group Activities
(vii) e-Resources (cell phone, storage devices, personal computer, internet.

Real Objects (Realia): These are all single-item objects. They are of two types: the natural (for example, water, rock sample, soil, insect, plant). The man-made (for example includes Cube, handkerchief, sandals, schoolbag, spoon, plate, table, bed, curtain, shirt, dress, and wristwatch). The figure below shows a typical cube, showing vertices, edges and faces that represent a possible outcome which can serves as instructional resources to teach a topic like probability.

Visual Resources

Projected

The projected visual resource require projector to display messages. Examples include; overhead projector transparency, slide (photographic, electronics), silent film.

Non-projected

No projector is required to display messages. Examples include; chart, still pictures, flashcard, map, model, traffic sign, newspapers cutting, short message sending (SMS)

Audio Resources They carry messages (data and information) and appeal to sense of hearing only for example, human voice, radio programme, audiotape recording, recording on compact disk, telephone signals.

Audio-Visual Resources

They carry messages (data and information). Appeals to senses of sight and hearing simultaneously, examples are; television programmes, video recordings, sound films, synchronized sound-slide system, DVDs.

Community-Based Resources

They may be real, complex resources, fixed; may not be moved from place to place, may be natural or man-made.
Natural includes: rivers, waterfalls, lakes, hills, caves, etc.
Man-made: schools, hospital, airports, markets, museums, dams, sports stadia, factories, zoos, workshops, farms etc.

Resources for Group Activities

They include games and simulations:
Games (instructional, educational): Devices that engage learners in competitive activities. Packaged with description, procedure, rules and how to determine winner, promote participation, team spirit and competition (affective domain) while learning. Examples include: Electric board game (instructional) scrabble (educational).

Stimulations

They are devices that engage learners in playing assigned roles to solve a common problem.

They are packaged with background information sheets, instructions, guidelines, visual and audio materials, etc., they promote problem-solving skills.

e-Resources/ICT Resources (Web-Based)

They are devices associated with the computer, for generating, storing, retrieving and displaying instructional communication. Examples include: cell phone (smart phone), digital camera, personal computer, storage devices (flash drive, CD, DVD etc), interactive board, etc.

The web-based resources are sourced from the web (internet). Materials can be gotten for teaching practically all subjects. This includes: visuals, audio, practical sessions.(http://www.rtciviced.org)-hypothetical

Guiding Items in the Selection of mathematics Instructional resources.

Suitability

The teacher using the resources should ensure the appropriateness of the materials for his intended learners. The resources should be suitable for their age, experience and intelligence. The legal, safety and ethical aspects of the materials to be used should equally be considered. The material should not portray any anti-social attitude. They should also be free from any bias, distortion or prejudice. If the materials would need electric power then an alternative should be sought to avoid disappointment from electricity.

Simplicity.

The resources to be used should be simple to operate or manipulate. The teacher should list the materials and ensure their workability before the actual date of use.

There should not be any technical problem and where electricity is to be used; provision should be made for an alternative power. No teacher should use electricity failure as an excuse for non-performance. In a situation where an instrument demands the hands of a technician, he (the technician) should be on hand and the teacher should have an insight into the operation of the instructional resources.

Relevance: - Care must be taken to ensure that only instructional resources that relate to the topic are used while teaching.

Qualitative

The Instructional resources selected for the teaching and learning of Mathematics by the teacher should be of good quality. Teachers should avoid the idea of "managing" with poor quality materials because he might not achieve the desired aim e.g. if a teacher wants the students to view the structure of an amoeba, she must make sure that the microscope to be used for this exercise must be a good one otherwise the objective of the lesson will be altered. Students will end up seeing the structure of an amoeba from a different perspective other than what it should be.

Recency

The resources should be the best or nearest to the best. It should not be out of date. It should reflect current and original thought.

Objective of the study

(i) To find out if instructional resources are available in the schools
(ii) To find out whether teachers are making use of the instructional resources in teaching mathematics
(iii) To measure the level of achievement through the use of instructional resources in teaching and learning mathematics.

Research Question

Are the Mathematics teachers using the available instructional resources?
How accessible are the instructional resources?
Does the qualification of Mathematics teachers affect the use of instructional resources?
Do Teachers find teaching easier when Mathematics Instructional Resources are used?

Hypotheses

Ho_1: There is no significant difference between teachers' and students' attitude to the use of instructional resources.
Ho_2: There is no significant difference between female and male teachers' attitude to the use of instructional resources.
Ho_3: There is no significant difference between teachers' qualification and the impact to the use of instructional resources in teaching and learning activities.

Methodology

The research adopted for the study was a descriptive research of survey type. The descriptive survey is directed towards determining the nature of the situation as it exists at the time of the study. It has the characteristics of analyzing the availability and effective use of instructional resources in teaching and learning mathematics. The research sampled one hundred and fifty (150) respondents out of the entire teachers concerned. Five schools were randomly selected in each of the Area Council, out of the entire schools, 5 questionnaires were administered in each of the school to five mathematics teachers from the selected schools across the Federal Capital Territory, Abuja. The data was statistically analyzed using frequency count and mean score. The use of the frequency and mean helped to know the number of respondent who responded to each item. Each of these items was assigned nominal values to determine the degree of agreement and disagreement. The reliability of the test was estimated by test–retest on Mathematics teachers across the schools. The coefficient of 0.82 was obtained using Pearson's Product Moment Correlation. Other statistical tools like t-test and Chi-square were used to resolves the hypotheses.

Data Analysis

Research Question 1

Are Mathematics Instructional Resources Available in the Schools?

Table 1: *Teachers responses to availability of mathematics instructional resources*

Statement	Agree	Disagree
Instructional resources for teaching/learning of mathematics are available in my school	65%	35%
Mathematics instructional resources for teaching & learning are accessible in my school.	66%	34%

Considering the above table 1: 65% of the teachers agree that Instructional resources for teaching and learning are available in their school while 35% disagree in the same vein, 66% of the teachers agreed that mathematics instructional resources for teaching and learning are accessible in their school while 34% disagreed.

From this result, we can conveniently conclude that instructional resources for teaching and learning of mathematics are available and accessible in FCT schools. This may be due to government concerted effort in the Federal Capital Territory to improve the quality of education.

Research Question 2

Are the Available Mathematics Instructional Resources Accessible?

Table 2: *Teachers' response on accessibility of mathematics instructional resources*

Statement	Agreed	Disagreed
Teachers have access to use mathematics instructional resources in teaching and learning activities	79%	21%
I teach mathematics better with instructional resources	71%	29%

From Table 2: It was observed that 79% of the teachers agreed that they have access to mathematics instructional resources in teaching/learning activities while 21% disagree likewise 71% of the teachers agreed that they teach mathematics better with instructional resources while 29% disagreed.

From this result we can also conclude that mathematics teachers have access to use mathematics instructional resources and can teach better when it is available in FCT schools.

Research Question 3

Do Teachers find teaching easier when Mathematics Instructional Resources are used?

Table 3: *Teachers response on teaching with instructional resources making learning of mathematics easier*

Statement	Agree	Disagree
I prefer teaching with instructional resources.	89%	11%
I involved other teachers to prepare local mathematics instructional resources	37%	63%
I am always interested in teaching mathematics using instructional resources in the class	92%	8%

92% of the teachers prefer to teach with mathematics instructional resources while 8% do not. Likewise, 67% of the teachers agreed that they are always interested in using mathematics instructional resources to teach in the class. From this result, we can conclude that teachers find teaching easier when Mathematical instructional resources are used in FCT schools.

Hypothesis 1: There is no significant difference between teacher and effective use of instructional resources

Total number of teachers = 150: source: Field, 2016

The result in the table 3 above shows that there is no significant difference between teacher and effective use of instructional resources, since the calculated Chi-square is less than the critical value i.e. (11.22 < 15.51) at 0.95 level of significance with the degree of freedom (df) 8, therefore the null hypotheses is accepted which states that there is no significant difference between teacher and effective use of mathematics instructional resources.

Hypothesis 2: There is no significant difference between female and male teachers' attitude to the use of instructional resources

Table 5: *Attitude of male and female teachers to mathematics instructional recourse*

Statement	Teachers' Gender				Calculated X^2-Value	Critical Value for X^2
	Male		Female			
Interest in usage of mathematics instructional resources in teaching and learning activities	N	%	N	%		
	79	53	71	47	9.02	9.49

Total number of teacher = 150: source: field, 2016

From the information in table 5 above the result reveal that calculated value X^2 of (9.02) is less than the critical value (9.49) at 0.95 and level of significance and degree of freedom respectively, the null hypotheses is accepted which says that there is no significance difference between male and female teacher attitude to the use of mathematics instructional resources.

H_{O3}: There is no significant difference between teachers' qualification and the impact to the use of instructional resources in teaching and learning activities.

Table 6: *Mathematics Teachers response to perceived impact of qualification to the use of instructional resources*

Statement	Qualification of Teachers									
Qualification of teachers to the usage of mathematics instructional resources to teaching and learning	NCE		B.Ed		M.Ed		Others		Calculated X^2-Value	Critical Value for X^2
	N	%	N	%	N	%	N	%		
	48	32	59	39	32	22	11	7	15.72	21.03

Total number of teachers = 150: source: field 2016.

Looking at the information above, the table reveals that the use of instructional resources will have significant impact on the teaching activities, since the calculated X^2 value is (15.72) less than the critical value (21.03) at 12 degree of freedom and 0.95 significant level therefore, the null hypotheses is accepted.

Summary of Findings

The summary of finding of this study is as stated below:

(i) There is no different between the perception of the female and male teachers' attitude on the use of mathematics instructional resources in teaching and learning activities in FCT secondary schools.

(ii) Mathematics instructional resources are available and accessible to the teachers in secondary schools in FCT.

(iii) Teachers have interest in the use of mathematics instructional resources in the teaching and learning activities in secondary schools.

(iv) Improvisation needs to be encouraged.

(v) Some of the teachers do not seem to know and cannot identify some common instructional resources used in the laboratory in mathematics classes.

(vi) Teachers in FCT do not seem to have enough information on contemporary mathematics instructional resources.

Discussion of Result

The findings of this study indicated that instructional resources make teaching and learning of mathematics easier for teachers and students. This is in agreement with the findings of Asebiomo (2014) whose findings indicated that teachers seem to be saying that utilization of mathematics instructional resources is vital to the success of any educational programme the teacher believed that mastery of subject matter is necessity for the teacher to have an effective utilization of the learning materials hence the need to develop a keen interest in the use of mathematic instructional resources.

Conclusion

Mathematics instructional resources are impactful to both the teachers and the learners alike in the teaching and learning activities. Mathematics instructional resources increase the interest of both learner and the teachers in teaching and learning. Therefore, it is effective and impactful in the teaching and learning process as it aids the teachers to deliver their lessons very well and also aid the students in understanding, comprehending and retention of information.

According to kindler (1993) it was stated that people generally remember 10% of what they read, 20% of what they hear, 30% of what they see, 50% of what they hear and see, 70% of what they say and 90% of what they say and do.

Recommendation

The following recommendations were made based on the review literature:

(i) The stakeholders in education such as teachers, head of schools, policy makers and government agencies should encourage teachers to effectively make use of instructional resources in teaching and learning mathematics

(ii) Stakeholders should also strengthen the teachers' capacity and keep them informed: They should be encourage to attend seminars, workshops and conferences in which experts and other professionals in their field interact among themselves.

(iii) Teachers should ensure that mathematics instructional resources are well maintained; school head teachers should supervise or monitor the utilization of these instructional resources.

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ENHANCING QUALITY EDUCATION THROUGH TEAM TEACHING AND COLLABORATIVE LEARNING STRATEGIES

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Abstract
The study focused on enhancing quality education through team teaching and collaborative learning strategies. The paper explained that team teaching is an approach to program delivery where two or more educators share teaching responsibilities within a classroom setting and collaborative learning strategies is situations was by two or more people learn or attempt to learn together. It is a review paper that explains the benefits of team teaching and collaborative learning strategies to enhance quality education. The benefits includes: Development of new teaching approaches, working closely with one another, increasing the student's level of understanding and retention, expose students to different view of the teachers, dynamic display of two minds and personalities, enhances problem-solving skills, inspires critical thinking, improves social interactions and supports diversity, aid the development of self-management skills, development of oral communication skills, and fosters the development of interpersonal relationships. The paper concludes that team teaching and collaborative learning strategies can enhance quality education as it allows the teacher and the students to learn from each other because of the cooperative activities that existed by using the two methods. It was recommended that team teaching should be more encourage and monitor by the education authority to enhance quality education in our schools and the teachers and lecturers should engage the students on a collaborative task to allow them benefits from each other in learning the given task to achieve more on quality education.

Keywords: Quality education, Team teaching, Collaborative learning and strategy

Introduction

Enhancing quality education can be achieved through team teaching and collaborative learning strategies. Quality education is type of education that policy makers employed by the public and private educational enterprises believing that it will influence learners in a particular way, so that the learners in turn will influence the society in a particular way. This "particular way" should be visible in the attitude and behaviours of learners who these policy makers hope will become "good" citizens of their societies (Janette, 2015).

The Team Teaching idea originated in United States of America (U.S.A.) in 1954 and it found its way to develop courses and it is a good innovation in teaching strategies (Umar 2018). According to Umar (2018), team teaching strategies are simplest form where all teachers of a subject collectively teach a class in that subject. In addition, team teaching is also called collaborative teaching or co-teaching strategy. It is used for different subjects with the help of different teaching method. Team teaching is an approach to program delivery where two or more educators share teaching responsibilities within a classroom setting. Both teachers

interact with all students at different times. Team teaching can benefit students by creating a sense of belonging to a larger group whilst still maintaining individuality, enables greater development of friendships among their mates, provides more peer models, allows teachers to work more independently with the students. This provides students with two or more teachers who have complimentary styles, experiences and expertise to benefit from and enables teachers to plan a more rigorous curriculum program for the students there are teaching.

Collaborative learning is a situations were by two or more people learn or attempt to learn something together. Unlike individual learning, people engaged in collaborative learning capitalize on one another's resources and skills by asking one another for information, evaluating one another's ideas, monitoring one another's work (Chiu, 2000 & Chiu, 2008). More specifically, collaborative learning is based on the model that knowledge can be created within a population where members actively interact by sharing experiences and take on asymmetric roles (*Mitnik, Recabarren, Nussbaum & Soto, 2009). C*ollaborative learning also refers to methodologies and environments in which learners engage in a common task where each individual depends on each other and is also accountable to each other (Chiu and *Khoo*, 2005). These include both face-to-face conversations and computer discussions which may be by online forums, chat rooms and many other (Echo, 2017).

Individual student needs can be catered for more easily and effectively with two adults in the room working with the diverse needs of the students. Teachers observe, discuss and devise the best fit program fit for the students. It also lowers the student/ teacher ratio and expands your teachers' professional expertise. Team teaching provides better outcomes for the students through being actively engaged in their learning and feeling connected to each other. Team teaching also lowers the disparity between curriculum expectations. This ultimately benefits student developmental progress. Having more students to choose to work with also allows them to feel more connected to their peers, develop deeper friendship networks and study with others of similar ability.

Thus, collaborative learning which is also known as cooperative learning is commonly illustrated when groups of students work together to search for understanding, meaning, or solutions or to create an artifact or product of their learning. Further, collaborative learning redefines traditional student-teacher relationship in the classroom which results in controversy over whether this paradigm is more beneficial than harmful and collaborative learning activities can include collaborative writing, group projects, joint problem solving, debates, study teams, and other activities (Chiu, 2004).

Benefits of Team Teaching and Collaborative Learning Strategies to Enhance Quality Education

The following are the benefits of team teaching to enhance quality education;

(i) **Development of new teaching approaches**

Team members are part of a supportive environment in which they are exposed to different styles of planning, organization, and class presentation. This gives the team members an opportunity to develop and enhance their own teaching approaches and methods. it gives the participating team teacher a supportive environment, it allows for development of new teaching approaches, it aids in overcoming academic isolation, increases the likelihood of sounder solutions regarding the discipline of problematic students and augments the opportunity for intellectual growth, (Karin and Michele, 2000).

(ii) **Working closely with one another**

Team teaching allows working closely with one or more colleagues which enables teachers to overcome the isolation inherent in teaching. When an instructor teaches alone, He or she rarely has the time or the opportunity for interacting with his or her fellow teachers, even though he or she is surrounded by educational colleagues (Karin and Michele, 2000). By working together, team teachers can discuss issues relating to students, such as behavioral expectations, student motivation and teaching policies, and end up with improved solutions that will lead to quality education.

(iii) **Increasing the student's level of understanding and retention**

Team teaching can open a student's eyes and interest to accepting more than one opinion and to acting more cooperatively with others. Team teaching provides educational benefits by increasing the student's level of understanding and retention, in addition to enabling the student to obtain higher achievement in whatever is been learned through team teaching (Karin and Michele, 2000).

(iv) **Expose students to different view of the teachers**

It expose a student to the views of one or more teacher and permits them to gain a mature level of understanding knowledge rather than considering only one view on each issue or new topic brought up in the classroom, two or more varying views help students blur the black-and-white way of thinking common in our society, and see many shades of natural in what their learning. In addition, diverse perspectives encourage students to consider the validity of numerous views (Karin and Michele, 2000).

(v) **Dynamic display of two minds and personalities.**

Dynamic display of two minds and personalities is when the teaming teachers present their respective content on the lesson to the same class at the same time, it will enables the students witness and partake in each of the topics that is of interest to them (Karin and Michele, 2000).

Echo, (2017), identified the following benefits of collaborative learning to enhance quality education This include:s

(i) Enhances Problem-solving Skills

Collaborative learning involves clear stipulation of an educational task with instructions that require students to discuss the work so as to come up with solutions to the problem. During the discussion, they are encouraged to listen attentively to the comments group members make. They also contribute to the sharing and can re-evaluate their views and come to conclusions. Though at times, group discussion may fall under the control of the loudest individual, students have to be systematic by giving each a chance to speak out; they also stipulate a time limit to minimize dominance. The fact that students must provide answers to the task at hand calls for active participation in researching the project at hand and examining every possible answer so as to arrive to make the right solution to the desired conclusion, thus improving an individual's problem-solving skills.

(ii) Inspires Critical Thinking

An active collaborative learning requires an instructor to view teaching as a method of developing and increasing students' capacity to learn as their role is to transmit information while facilitating the learning process. It includes creating and handling

meaningful learning experiences that stimulate students to think through actual and existent problems. Through collaborative learning, we expect students to clarify ideas, views, and opinions through their discussion forums before making a conclusion. It, therefore, nurtures the improvement of critical thinking skills via interpretation of ideas, and assessment of other student's thoughts and views.

(iii) Improves Social Interactions and Supports Diversity

One of the collaborative learning advantages involves the use of different strategies such as Jigsaw technique which involves separating a task into subtasks. The jigsaw technique is a system of designing classroom activities in a way that students rely on each other to accomplish the tasks. It involves students forming groups, and each group handles part of the job so that at the end they all create a complete activity just like a jigsaw puzzle. Use of Jigsaw strategy provides students with the chance to enthusiastically help each other shape understanding as the instructor assigns them to groups that require varying skill.

To efficiently handle the task, students from different groups have to meet to exchange ideas and opinions amongst themselves. This kind of teamwork allows students to be experts in their allocated subject areas. At the end students then go back to their class and teach others.

(iv) Aid the Development of Self-management Skills

Collaborative learning requires you to be a good decision maker. It is evident in group-works where you have to be able to do and willing to take a difficult task or assignment and break it down so that you can find the solution. To be a good self-manager you will have to be a good problem solver, able to think through challenging tasks, study problems, examine and scrutinize solutions. Self-management skills are those individual attributes that help you feel and be more dynamic and productive in the office. With self-management competencies, you can interconnect and interact professionally and competently with your colleagues, managers, and even clienteles. They also help you make good decisions and improve time management.

(v) **Development of Oral Communication Skills**

Collaborative learning is dependent on the effectiveness of the group for the students to attend and accomplish their assignments. The entire group discussion relies on strong communication skills (sending information, receiving feedback, and sharing it with the whole class). You also have to comment (orally and in writing) when looking for ideas. You can achieve success within a group; students need to be able to communicate both on intellectual and emotional levels by explaining their thoughts, expressing their feelings openly but positively, listening prudently to others, asking questions and clarifications on other students opinion and telling how others feel through their nonverbal communication. With collaborative learning, one can reflect on the actions and exchanges of the group and encourage others to do well as members share their thoughts, ideas, and feelings.

(vi) Fosters the Development of Interpersonal Relationships

For collaborative learning to work, students must work together in their groups. When students spend their time together working, they learn how to relate with one another. They also make friendship by getting to know each other, thus boosting group morale and performance. It means that they can laugh or cry together. When people are

friends, they form symbiotic and trusting relationships which give the team members a sense of belonging. Usually, before or after a group discussion, members engage in casual conversation which fosters the development of interpersonal relationships.

Conclusion

Quality education is the education that policy makers employed by the public and private educational enterprises believing that it will influence learners in a particular way to have a good citizen for the society. Team teaching strategies are simplest form where all teachers of a subject collectively teach classes in that subject and collaborative learning is a situation were by two or more people learn or attempt to learn something together**.** Team teaching and collaborative learning strategies can enhance quality education as it allows the teacher and the students to learn from each other because of the cooperative activities that existed by using the two methods.

Recommendations

The following recommendations were made based on the finding from this study that:

(i) Team teaching should be more encourage and monitor by the education authority to enhance quality education in our schools.

(ii) The teachers and lecturers should engage the students on a collaborative task to allow them benefits from each other in learning the given task to achieve more on quality education.

(iii) Awareness activities on collaborative learning should be created by the schools to motivate students or children to accept collaborative learning in a constructive classroom.

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THE USE OF DIGITAL DICTIONARY AS AN INNOVATION TECHNIQUE OF TEACHINGVOCABULARYFOR QUALITY EDUCATION

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Abstract
Digital technology platform is a contemporary phenomenon innovation in modern teaching and learning process. The innovation in the use of dictionary has demonstrated the fast use of digital technology for effective teaching and learning activities. In modern teaching techniques, digital dictionary has become an innovative idea for teaching regardless of time and space. It is against this backdrop that the paper examines the use of dictionary as a tool for enhancing quality education. The paper also views the concept of digital library as well as the use of digital dictionary as an innovative in teaching vocabulary. The paper also discussed the benefit as well as challenges of digital dictionary for effective teaching and learning. The paper concludes that even though the benefit of digital dictionary in language learning is recognised, the ability of teachers and students to utilised digital dictionary for effective teaching and learning process for enhancing quality education is still a challenge in sub-Saharan Africa and particularly in Nigeria recommendation for the way forward was provided.

Keywords: Digital, Dictionary, Techniques, Vocabulary, Teaching and learning.

Introduction:

It is paramount one to consider the recent changes in the techniques of teaching vocabulary in the process of learning and teaching process where by both the teachers and students have shifted their attention to digital form rather than analogue form. Because of the wide separate of technology, the paradigm of teaching and learning process was totally change with the use of computer, internet, E- library, Digital classes, virtual class room as well as digital dictionaries for enhancing teaching and learning techniques. Therefore, the innovative techniques of teaching and learning vocabularies have chance to the digital dictionaries in search of the correct pronunciation of words (phonological), in search of meaning of words (semantics), in search of formation, derivation of the new words (morphological) among other form of teaching and learning are the motive behind investigation of the use of digital dictionary as a technique in teaching and learning vocabulary in education especially in related to Northern- Nigerian education.

Statement of the problem

One of the most significant challenges that teachers and learners face during the process of the use of digital dictionary is learning vocabulary. Vocabulary has been known as a central point in any language learning in which inadequate vocabulary knowledge of the learners led to problems in educational use (Asgari& Mustapha, 2011). The use of digital dictionaries is a great help in vocabulary learning, and nowadays the development of electronic dictionaries has added a new and appreciated resource for vocabulary learning (Asgari & Mustapha, 2011). Studies have found that e-dictionaries/ digital dictionaries had a great help to students in learning new vocabulary, besides it is an interesting, fun, tool to use.

Since dictionaries have not been explored extensively in Nigeria, research into the use of digital dictionary caught the researcher's attention and pressed them to explore students' experiences in applying digital-dictionaries in learning new vocabularies in Educational Readings in the English Language. It will also help in filling the gap in the scarcity of research in this area and enrich the research in areas of pedagogy and technology integration into teaching.

Scope of the study

This research is restricted to explore the students' experiences in two sections of "Educational Readings in English" and process of learning new vocabularies among the teachers and learner especially in tertiary institutions in northern Nigeria in using digital dictionaries in learning new vocabularies in an English language course.

Research Objectives

This inquiry aims at:

(i) Casting off the light on teachers/students' observations and experience in using digital dictionary in learning vocabulary in Educational.
(ii) Exploring the teachers/students' attitudes toward digital dictionaries in teaching and learning vocabularies.
(iii) Highlighting major difficulties and challenges in using digital dictionaries.

Research Questions

The study attempts to investigate the teachers and learners in Nigerian Education's experiences in using digital dictionaries; it is specifically designed to provide answers to the following questions:

(i) What are the teachers/students' perceptions in using digital- dictionaries in learning vocabularies?
(ii) What are the teachers/students' experience in utilising digital-dictionaries in learning new vocabularies in education?

Significance of the research

The implication of this research stems from the scarcity of studies on the role of digital dictionaries in learning English vocabularies. This work will inform educators, teachers, stakeholders, as well as fellow researchers the experience of using digital dictionaries in learning new vocabularies and highlights the major subjects in using that innovative tool in English language learning.

Review of Related Literature

There is confirmation that teachers and learners who check dictionaries to find the meaning of words while they involve in reading and listening boost their teaching and learning vocabulary (Hulstijn, Hollander, & Greidanus, 1996; Knight, 1994; Rezaei & Davoudi, 2016). It provides quick and direct admission to several layers of vocabulary knowledge. It can serve many purposes, especially in providing the definition of words. The existing literature on vocabulary learning strategies illustrates that language learners can find out new vocabulary on their own by using dictionaries. Moreover, the use of dictionaries of the voice of the learner facilitates vocabulary learning as easily as text understanding (Hulstijn, Hollander, & Greidanus,1996; Knight, 1994). Also, Neubach & Cohen, 1988 as cited in Kobayashi, 2006 reported that consulting a dictionary improves the retention of learning the terminology.

There has been a growing interest in the role of electronic or digital dictionaries for learning new vocabularies of languages. Accordingly, there has been an increase in students' use of

electronic dictionaries for vocabulary purposes (Dashtestani, 2013). Digital dictionaries (DD) have advanced rapidly in the last three decades (Rezaei & Davoudi, 2016). From the first human-readable digital dictionary (DD) available for the public in the late 1980s, DDs have been obtained on CD-ROM, small hand-held calculator-type reference works (i.e. Pocket DD), and online (Nesi, 2009). Research shows, according to Rezaei & Davoudi, (2016) that DDs are in many respects valuable. Compared with the bulk of paper dictionaries and slow retrieve, the increasing popularity of DDs can be credited to better readability and their ease of use, which makes the consultation process less time-consuming (Stirling, 2003; Kobayashi, 2006 as cited in Rezaei & Davoudi, 2016). In addition to CD-ROM and handheld devices, researchers also began to show interest in online dictionaries, due to the rapid advance of the Internet, smartphones, and iPads, and other ways of obtaining information (Rezaei & Davoudi, 2016).

Teachers and students are clearly affected by the technology that has driven the world and got interested in the latest technological products. Digital Dictionaries (DDs) are becoming widespread as new technological tools of vocabulary learning among L2 learners will be used more broadly by language learners. Since dictionaries have not been researched widely in Northern -Nigeria, research into the use of them caught the researchers' attention and urged them to explore teachers and students' experiences in using digital-dictionaries in learning new vocabularies in Educational. It will also help in filling the gap with the existing research in this area.

The use and benefits of dictionaries and digital -dictionaries in learning new vocabularies has expanded rapidly in the past two decades (Dashtestani, 2013; Knight, 1994; Laufer & Hulstijn, 2001; Hulstijn, 1993; Fan, 2000; Hua & Zarei, 2013; Davoudi, 2016; Stirling, 2003; Kobayashi, 2006; Li &Xu, 2015; Nesi, 2009). Hence, this segment highlighted some of the subjects that administered with this area and guided this exploratory work.

Dashtestani (2013) conducted a comparison survey to compare between Iranian EFL students' and teachers' perspectives on the role of e-dictionaries. Participants of the study were 126 EFL students and 73 EFL teachers and were invited to reply to questionnaires. Among them, 81 students and 66 teachers participated in follow-up interviews. Both EFL faculty and students held moderately positive attitudes toward the role of electronic dictionaries for learning EFL. They also suggested that there are several obstacles and challenges, including lack of training on the use of electronic dictionaries, students' use of unsuitable versions of electronic dictionaries, lack of facilities to use electronic dictionaries in EFL

Classrooms and distraction from learning caused by using digital dictionaries in the school room. The analysis of data further revealed that the bulk of students use digital dictionaries installed on their cell phone telephones. The pupils expressed a penchant for using electronic dictionaries over paper dictionaries.

Stirling, (2003) also described teachers and students' reactions to pocket digital dictionaries (PDDs), more or less significant features of these devices, and practical techniques and natural processes for using them to enhance, rather than restrict with the teaching and learning process. The attitudes of teachers, according to Stirling, 2003 varied between "Great to see students using dictionaries independently" to "I will not have them anywhere near my classroom." Moreover, some students looked up more than twenty words a lesson, while others merely used them at home to get extra information about Lexis studied in grade.

The aim of Oluwola, (2000) study is to investigate the look-up behaviour of bilingualised dictionaries of Yoruba teachers and students. It centred on the frequency of usage of dictionary information and how useful such information is comprehended. Oluwola, (2000) also established, a comparison between students more proficient in English vocabulary and those less proficient in identifying the dictionary searching behaviour which may enhance L2 vocabulary learning. The issues under study included more than 1000 recent admitted students to the seven tertiary institutions of Nigeria. The instrument for data collection comprised a questionnaire and the Word Levels Test. This investigation found that the overwhelming majority of students use bilingualised dictionaries and they find them useful. At the same time, the findings of the study have revealed that most students make only limited use of bilingualised dictionaries

The findings revealed various thematic aspects such as the learner's preference to use monolingual dictionaries than bilingual English Yoruba dictionaries. This finding suggests that students seem to deliver a fuller perception of the strength of such monolingual dictionaries in finding the correct senses of the words with multiple senses through the process seeking the meaning of L2 words using L2 definitions. The survey confirms the parameter for the strength of the monolingual dictionary as pointed out and recommended by many other previous researchers such as Oluwola (2000), Baxter (1980) and Nation (2001). In this sense, the study affirms the findings of previous works, which argue for the effectiveness, and advantages of the monolingual dictionary use in learning English especially for students at higher degrees of instruction.

As L2 learners progressively depend on electronic reference materials, Kobayashi, 2006 thought that it has become important to investigate how such materials are applied and what impact they have on L2 learning. Digital pocket dictionaries (DDs) have particularly become popular among Asian learners of English in the past decade. The survey compared the role of DDs with PDs among Japanese university students. It also tested the relationships between students' DD use and their role in lexical processing strategies (LPS; consult, infer, or snub), their vocabulary learning, and their interpretation.

This study investigated these issues both quantitatively and qualitatively, through multiple investigative techniques. The findings showed that DDs had become common tools for Japanese scholars of English; the majority of pupils (72% of 279 students) owned a DD, and those who owned it tended to utilize it alone, although they too owned a paper Dictionary PD. The answers showed the complex nature of the effects of DDs. DDs look to increase the frequency of dictionary consultation by students, especially by low-proficiency students.

Research Methodology

Study design and rationale:

The work relies on utilising the qualitative approach, which requires gathering information from focus group discussions with teachers and students who are shown in the tateriar education in Nigeria. According to Creswell and Plano Clark (2011) had defined qualitative data as a data that provide a detailed understanding of a problem or experience. While Marshall and Rossman, (2010) argued that qualitative research is carried in a natural setting with the author observing, questioning, and collecting data for analysis to construct a holistic understanding and agency of the berth. As the purpose of the written report to explore students' experiences in applying digital-dictionaries, therefore the qualitative data in this study provide a fuller understanding of students' experiences regarding use e- dictionaries in EFL classes (Rallis and Rossman, 2012). A

sample of 25 teachers and students took part from both sections in focus group discussions. The groups consisted of five students in pair session, and each session lasted one hour.

Procedure
Teachers and students on the courses of teaching and learning were used to download dictionary applications on their phones as to use them during reading the articles that are specified for the courses. The teachers and students got the option to choose the kind of dictionary that they like to use; some students had a meeting after a time of using the application to discuss the kinds and names of dictionary applications that they were using. Concerns were gone through, and questions were answered at that meeting. Throughout their programs and as a commencing point, students read each article on their own, then the class instructor and students discussed the article, explained the meaning of new lexicons, and wrote down some questions related to the read the article. Students were encouraged to use mobile dictionaries and were afforded the time to look for the meaning of new words before had the treatment. Teachers on the other hands assured to draw out the meaning from the students and agreed upon with the proper and the closest meaning for each new word.

Both teachers and students on some occasions were also encouraged to contemplate on the articles by writing a paragraph or two on their understanding, thoughts, and opinions of the items. They were also invited to use digital dictionaries in doing that composition. This process lasted for the whole semester and the students had the focus on group discussion just at the conclusion of the semester.

The following portion of the study will identify some of the findings that came up during student and teachers focus discussion.

Study Findings
The aims of this study are to highlight students' experiences in using a digital dictionary in learning new vocabularies. Moreover, it explores students' attitudes toward using mobile dictionaries in learning. This portion of the field will highlight some of the findings in relates to that purpose.

Attitudes and perspectives
Teachers and students in all focus group discussions showed positive attitudes and healthy perspective toward digital dictionaries through stressing out the importance of using it in learning new vocabularies, pinpointing some of its benefits, and the rate of using it in all language aspects like reading, writing, and pronunciation.

Fun
The study also revealed that both teachers and students use digital dictionary for Fun, because they cognise how to answer and participate not only gearing up as a speakers/listener. But rather more engaged in studying the new vocabularies for fun.

(i) We utilise technology. It is pleasant.
(ii) Very positive feeling, it leaves me to test out fresh ways of teaching and depend on myself.

In regards to its importance, students highlighted that digital dictionary is very easygoing, simple to use, quick in finding the meaning, help in increasing students' participation and involvement. On the peak of that, it enhances the students' dependency and autonomy.

The study also found that it helped both the teacher and students a great deal and saved their time. Not relying on people or big bucks- referring to book dictionaries simply write a word that you are looking for and that is set.

(i) Encouraging students to teach and learning.
(ii) Increase students' participation.
(iii) Increase students' engagements.
(iv) Identify new technology.
(v) Dependency.
(vi) Gives the feeling that you are more advanced.
(vii) The most significant thing that you do not call for a people's favour

The idea of students' autonomy in learning was emphasized during focus group discussions, and students pointed that they rely on themselves more in their learning and they do not wait for people to help and favour them in searching of the meaning of the word. They relied on themselves more; it is not anymore now that ask for every word we do not recognize.

Discussion

On the course of discussion the researchers focus solemnly on the snapshots of teachers and students' experiences in using mobile dictionaries. Both teachers and students portrayed ways of using digital dictionaries in learning new vocabularies are focus group discussions revealed that they used a digital dictionary for getting the meaning of new vocabulary, pronouncing those new words, spelling, and in writing. For example, students indicated that mobile dictionary is a very helpful tool in pronunciation, where as teachers used to show the actual pronunciation of word by using the digital dictionary to students.

The digital dictionary also reminds the students' that I' know the meaning of the word from the class. But sometimes at home, I forget how it is pronounced; therefore I look again for it for its pronunciation through it.

However, sometimes students pointed out also that digital mobile dictionaries help in writing tasks and assignments, especially when they had their ideas in their native languages, but could not express them in the English Language. The mobile digital dictionary was a helpful tool in finding the meaning of new words in the classroom and outside the classroom. It helped students getting the sense of new words that they are not familiar with which facilitated their discussion in the classroom. Students recorded several ways in using mobile dictionaries outside the classroom, for example:

Finding the right meaning of the text that students are reading is the greatest challenge that students faced in using mobile dictionaries. Bilingual dictionaries provide wide many meanings for each word and students had difficulty identifying the correct meaning for each word

There is a difficulty for example; there are words that have more than one meaning. I read the sentence, look for its meaning and find out later on that what is have chosen is not what the writer aimed at.

In relating to names of dictionary applications that students used for that course, they recorded names ranged within Google Translate, Box native - English, Golden Dictionary, Comprehensive Dictionary, Dictionary Hausa-English, offline English Dictionary. Students indicated that they did not face any technology problem or Internet issue while using digital dictionaries as they used the offline version in the classroom due to lack of the Internet connectivity.

Conclusion and Recommendations.

In conclusion of this research one can deduced that digital dictionary is paramount in today's teaching and learning vocabularies because of its flexibility, simplicity and mobility as well as easy in terms of use. Teachers and students also highlighted that they used the digital dictionary mostly in pronunciation, spelling, writing, and most importantly in finding the meaning of new vocabulary. They had fun, and interesting experience in applying such kind of technology in language learning. That such a nice experience echoes with other previous studies like Hulstijn, Hollander, & Greidanus, 1996; Knight, 1994; Kobayashi, 2006). These studies indicated that using both bilingual and monolingual have their unique strengths in developing vocabulary knowledge and students value that experience. These studies demonstrated general patterns of dictionary use for word meaning, L2 students also use dictionaries for other information such as pronunciation, spelling, and syntax.

Although teachers and students reflected on the process of using mobile digital dictionary as easy and straight forward, and they do not need training on using digital mobile dictionaries, further discussions on that topic revealed that they faced challenges in identifying the right meaning among several that mobile dictionaries provide. This point seems critical, and teachers should spend some time explaining the different kinds of suitable digital mobile dictionaries and train students how to use it appropriately.

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A STUDY ON THE USAGE OF SOCIAL NETWORKING SITES AND ITS IMPACT ON ACADEMIC PERFORMANCE OF NIGERIAN UNIVERSITY STUDENTS

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Abstract
This study examined the usage of Social Networking Sites (SNSs) among university students and the influence they have on their academic performance. Descriptive survey design was used and the population of the study was the undergraduates of Bayero University, Kano. Proportionate sampling technique was employed to select the participants across the faculties. Researcher made Questionnaire with reliability index of .86 was used for collecting the data. Out of 382 copies of the questionnaire distributed, 342 were retrieved which represented a response rate of 91. %. SPSS was used for the analysis of the data. The study revealed that majority of the students have access to one or more SNSs. Facebook was found to be mostly used by the students ant followed by Whatapp. The study further confirmed that most of the respondents visit their social networking sites (SNSs) frequently and spending one to three hours per day chatting with friends. In addition the study revealed that the use of SNSs had negative effects on their academic performance. The study recommended that students should be encouraged to use their mobile phones to supplement their reading and research rather than the usual chatting with friends. Students should be encouraged to limit the time they spend on their SNSs per day and advise them to rather substitute those hours in reading.

Keywords: Social Networking Sites (SNSs), Academic Performance, Facebook, Whatapp

Introduction

Internet became an inseparable part of human life and more than just a means of seeking information. People have discovered that the Internet can be used to connect with other people for business or commercial purpose, to make new friends, or to reawaken old friends and long lost relatives. The emergence of social networking sites (SNSs) simplifies the process because they do not require advanced internet knowledge or experience and are made up of a wide array of different formats and topics. This means that anyone can connect through SNSs. With such extensive acceptance, it is no surprise that SNSs have impacted the way people live and socialize (Megat, 2011). Social media has revolutionized corporate communications, rapidly changing the way that public relations campaigns or programs are distributed and measured (Matthews, 2010). Social networking has taken the world towards a rich communication society.

Review of Related Literature

Social Networking Sites have been defined as web based services that, within a bounded system, enable individuals to construct a semi-profile and articulate a list of other users with whom they share connections and views (Boyd & Ellison, 2008). The rapid adoption of social networking sites (SNSs) raises important questions about the social implications of such usage. The majority of SNSs users are young people, who have been called 'Digital Natives' (Prensky, 2010).

SNSs consists of online technologies, practicing activities or societies that people use to generate content and share thoughts, visions, experiences and viewpoints with each other

(Lusk, 2010). The word social networking is known as the alliance of individuals into specific set of potential groups or subdivisions. It allows individuals to express their thoughts to other users. Social networking is the leader in promoting digital journalism (Thuseethan & Vasanthapriyan, 2014). Social network is used for several purposes like promoting or distributing the news contents throughout the world.

Academic performance is defined as "...how students deal with their studies and how they cope with or accomplish different tasks given to them by their teachers" (Banquil, Chua, Leano, Rivero, Burce, Dianalan, Matinezo & Timog, 2009).

A student's involvement in activities like making friends on SNSs should be seen as students having access to relevant information that can be channeled towards improving the students' academic performance. This depends on the ability and willingness of the concerned individual to be able to harness that opportunity and to cope with academic related stress (Banquil et al, 2009).

Tham and Ahmed, (2011) in their study examined the usage and implication of social networking sites among college students. Results of the study revealed that female college students spent more time on SNSs than male students. In general the time spent on SNSs decreased as the age of the respondent increased.

Kumar and Kumar (2013) made an attempt to study the activities and reasons for using social networking sites by post graduate students and research scholars. Results of the study found that majority of the respondents were aware of and making use of such application in their research work. The study also revealed that Facebook is most popular SNSs among the all categories of students and research scholars.

Bhola and Mahakud (2014) indicated that most youngsters begin social networking at 14.6 years; the average time spent on Social Networking is 3.6 hours daily. Facebook is most preferred SNS for the function of Chatting and making friends night chatting and interaction with the opposite sex is common, have interest in electronic gadgets, ignore daily activities, hide their online tasks from others, use SNS secretly and feel frustrated in its absence.

Arumugam, Nagalingam, and Ganesan (2014) indicated that majority of teenagers were addicted to Social Networking Sites and hence proper steps should be taken to create awareness among teenagers and their parents regarding the addictive behavior and risk factors associated with the usage of Social Networking Sites.

Sampasa-kanyinga and Lewis (2015) in their study investigated the association between time spent on Social Networking Sites (SNSs) and unmet need for mental health support. Among other things,it was found that out of total samples 25.2% of students reported using SNSs for more than 2 hours every day, 54.3% of students reported using SNSs for 2 hours or less every day, and 20.5% reported infrequent or no use of SNSs.

Statement of the Problem

It is a common sight to see a youth chatting in sensitive and highly organised places like church, mosque and lecture venues. Some are so carried away that even as they are walking along the high way, they keep chatting. The manufacturing and distribution of equally sophisticated cellular phones has complicated the situation, as youths no longer need to visit a cybercafé before they send and receive messages. Attention has been shifted from visible to

invisible friends, while important ventures like study and writing are affected in the process. This phenomenon has become a source of worry to many who believe in knowledge and skill acquisition.

Academic success is a supreme goal to any student with the social and family responsibility they have. University students are one of the major group using SNSs for fun, with the main purposes of connecting with their friends, sharing day to day activities, using features such as photo sharing, publishing wall posts, and stating their status updates.

The emergence of social media as a result of advancement in technology and expansion in internet software has raised eye brows among academics on its (social media) impacts on studies. Students at all levels of learning now have divided attention to studies, as a result of available opportunities to be harnessed from social media. Whether these opportunities promote studies is a question that needs to be answered (Asemah, Okpanachi & Edegoh, 2013).

Social networking sites are most common now a day in our society. Many researchers done a lot of work in the recent years, Ogedebe (2012) conducted a research on usage of Facebook and its effect on academic performance of students. Most of the researches reviewed emphasized on Facebook use and academic performance.

Over the years, social networking among students has become more and more popular. It is a way to make connections, not only on campus but with friends outside of school. Social networking is a way that helps people feel they belong to a community. Due to the increased popularly of it, economists and professors are questioning whether grades of students will not be affected by how much time is spent on these sites. Choney, (2010), MehMood and Taswir, (2013), Kist (2008), Jacobsen and Forste, (2011), believe that the use of technology such as internet is one of the most important factors that can influence educational performance of students positively or adversely. Many parents and guardians are worried that students are spending too much time on Facebook and other social media sites and have not enough time to study. Though parents are worried about students' constant use of the social media sites, many students continue to utilize these sites on a daily basis. It is against this background that this research is being conducted to ascertain the impact of students' use of social media sites on their academic work. Thus, the problem of this study focused on investigating the usage of SNSs and its impact on the academic performance of undergraduates of Bayero University, Kano, Nigeria.

Objectives of the Study

This study was guided by the following objectives:

(i) To determine the most favourite SNSs among the undergraduates of Bayero University, Kano.
(ii) To determine the extent ofSNS suse by the undergraduates of Bayero University, Kano.
(iii) To find out the purpose of using SNSs by the undergraduates of Bayero University, Kano.
(iv) To find out the influence of SNSs on the academic performance of undergraduates of Bayero University, Kano.

Research questions

This study provided answer the following questions:

(i) What is the most favourite SNS used by undergraduates of Bayero University, Kano?

(ii) What is the extent of SNSs use by the undergraduates of Bayero University, Kano?
(iii) What is the purpose of using SNSs by undergraduates of Bayero University, Kano?
(iv) What is the influence of SNSs on academic performance of undergraduates of Bayero University, Kano?

Methodology

The research design for this study was descriptive survey. Survey design is the study of the characteristics of a sample through questioning, which enables a researcher to make generalization concerning the population of study. A researcher developed questionnaire was used as the instrument for the study. The questionnaire was pilot tested and the results were analysed. The obtained Cronbach alpha for the instrument was .86 which appeared to be accepted and reliable to use the instrument for data collection in the main study. The population of the study was 34,050 undergraduates of Bayero University, Kano. Proportionate sampling procedure was employed to select 382 students across all the eighteen (18) colleges and faculties of the University, while simple random sampling was used to select the individual respondents from each faculty proportionate to their population. The required sample size was determined based on the recommendation of Research Advisors, 2006. The respondents were given the instrument seeking information related to usage of SNSs by them and the perceived influence of SNSs on their academic performance. Three hundred and forty two (342) copies were retrieved. This gave a response rate of 89.5%, which was representative of the sample. The impressive response rate was obtained because the data was collected during lecture hours in the various departments. Respondents were given between 20- 30minutes to complete the questionnaires. The results were analyzed using Statistical Package for Social Science (SPSS) and presented in tables.

Table 1: Population of the study

S/N	Faculty	Number	Sample
1	Agriculture	1646	18
2	Allied Health Sciences	1676	19
3	Arts And Islamic Studies	3202	36
4	Basic Medical Sciences	1488	17
5	Biomedical Sciences	151	2
6	Clinical Sciences	615	7
7	Communications	875	10
8	Computer Science and Information Technology	1331	15
9	Dentistry	101	1
10	Earth and Environmental Sciences	1177	13
11	Education	7420	83
12	Engineering	2720	30
13	Law	1149	13
14	Life Sciences	578	6
15	Pharmaceutical Sciences	153	2
16	Physical Sciences	601	7
17	Science	3491	39
18	Social And Management Sciences	5676	64
	Total	**34050**	**382**

Source: MIS, Bayero University, Kano (2018).

Results and Discussions

Research question 1: What is the most favorite SNSs used by the undergraduates of Bayero University, Kano?

Table 2: Favourite Social Networking Sites

S/N	Sites	Frequency	Percentage (%)
1	Facebook	211	61.7
2	WhatApps	104	30.4
3	Instagram	12	3.5
4	Snapchat	11	3.2
5	Others	04	1.2
	Total	**342**	**100**

Table 2 indicated that the respondents gave the following as their favourite social media sites; Facebook 209 representing 61.7%, WhatsApp 104 representing 30.4%, Instagram12 representing 3.5%, Snapchat with 11 representing 3.2 %, and Others with 1.2 % respectively. The analysis shows that Facebook is the most favourite social media site and is followed by Whatapps. This may be related to the fact that almost all the recent mobile phones support Facebook application but only androids phones support Whatapps application. This study confirms Schreider's (2010) assertion that majority of undergraduate students are Facebook users. It also stressed the finding of Bhola and Mahakud (2014) who indicated that Facebook is the most preferred SNS for the function of Chatting and making friends night chatting and interaction with the opposite sex.

Research question 2: What is the extent of SNSs use by the undergraduates of Bayero University, Kano?

Table 3: Extent of Social Networking Sites use by the Undergraduates

Parameter		Frequency	Percentage (%)
SNSs usage	Yes	334	97.6
	No	8	2.4
	Frequently	288	84.2
	Once in a while	54	15.8
Extent of SNSs usage	Weekly	0	0
Number of hours spent on SNSs	1-3	271	79.2
	4-6	50	14.6
	7-9	21	6.2

Respondents were asked to indicate whether they are using any SNSs or not, 334 (97.6%) of the respondents believe thatthey are using one or more SNSs, while only 8 (2.4%) of the respondents said that they are not using any SNSs. In relation to the extent of use, 288 (84.2%) frequently visit their SNSs, 54(15.8%) once in a while and none of the respondents visit his/her SNSs weekly. When asked about the time spent on their social networking sites, 271 of the respondents representing 79.2 % indicated that they are spendinglike one to three hours, 50 respondents representing 14.6% are spending between four to six hours and the

third group of 21 respondents representing 6.2% said that they are spending between seven to nine hours a day on the social networking sites. The study confirms Choney's (2010) assertion that due to the popularity of SNSsacademics are questioning whether students' academic performance would not be affected by how much time they spent on these sites. MehMood & Taswir, (2013), further claimed that the use of technology such as the SNSs is one of the most important factors that can influence educational performance of students positively or negatively.

Research question 3: What is the purpose of using SNSs by undergraduates?

Table 4: Why Students Use Social Media

S/N	Response	Frequency	Percentage (%)
1	Chatting	266	77.8
2	Downloading music and Video	16	4.7
3	Academic Works	48	14
4	Others	12	3.5
	Total	**342**	**100**

Table 4 indicated that 266(77.8%) use the SNSs for chatting with friends, 16 (4.7%) use it to download music and videos, 48 (14%) use it for academic works and 12 respondents representing 3.5% use it for other purposes. The study revealed that majority of the respondents 294(85.7%) do not use the SNSs for academic purposes.

Research question 4: What is the influence of SNSs on academic performance of undergraduates?

Table 5: Influence of Social Networking Sites on Students' Academic Performance

S/N	Response	Frequency	Percentage (%)
1	Positively	130	38
2	Negatively	177	51.8
3	Not Certain	55	16.2
	Total	**342**	**100**

Respondents were asked whether the use of the SNSs affects their academic work positively or negatively, 130 (38%) of the respondents indicated that SNSs affects their academic performance positively, 177(51.8%) believe that SNSs affects their academic performance negatively, and only 55(16.2%) were not certain about the influence of SNSs on their academic performance. The table revealed that majority of the respondents 177(51.8%) agreed that the use of social media affect their studies negatively. This study confirms MehMood and Taswir's (2013) study that the use of technology such as the internet is one of the factors that can influence students' performance positively or adversely. This is further supported by Choney, (2010) and San Miqual (2009) who believe that students' use of SNSs will have negative effect on their academic performance. The study is in line with the finding of Choney (2010), where he stated that "in looking at the time spend on Facebook and its effect on academic performance of students, users of Facebook have an average GPA of 3.06, while non-users have an average GPA of 3.82". Therefore spending much time on social media contributes to low academic performance. This implies students who use the social media sites frequently turn to perform poorly academically. San Miguel (2010), focused on the relationship between the use of Facebook and the academic performance of students. The findings indicated that more use of Facebook result in lower grades. In his study, the average Facebook user had a GPA of 3.0 to 3.5, while the non-Facebook user had a GPA of 3.5 - 4.0. Also, the average Facebook

user study for 1 – 5 hours per week, while the non-Facebook user would study 11 – 15 hours per week.

Conclusion

The study was conducted to examine the impact of social networking sites (SNSs) on the academic performance of undergraduates of Bayero University, Kano. The study revealed that majority of the respondents had mobile phones with internet facility and are aware of the existence of SNSs. Majority of the respondents have access to Facebook and Whatapps which they use their phone to access and they believe that they are visiting them frequently spending lengthy time chatting with their friends every day. As a result of that lengthy time they are spending in chatting, the study revealed that the SNSs had affected their academic performance negatively.

Recommendations

Based on the findings of this study, the following recommendations are made:

(i) That students should be encouraged to use their mobile phones to supplement their reading and research rather than the usual chatting with friends.

(ii) Students should be encouraged to limit the time they spend on their SNSs per day and advise them to rather substitute those hours in reading or any other educational activities.

(iii) Students should be introduced to sites that can add values to their academic work and research.

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STRENGTHENING COLLABORATIVE LEARNING STRATEGY ON PERFORMANCE AND RETENTION IN PHYSICS FOR QUALITY EDUCATION

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Abstract
The study investigated the effect of collaborative learning strategy on performance and retention in Physics for Quality Education in public secondary schools in Niger State, Nigeria. The study adopted quasi-experimental design and used 245 SS II Physics students in two public secondary schools at Bida Local Government area. The experimental period which lasted for six weeks the students were tested on the concepts of work, power energy using Physics Achievement Test (PAT) whose reliability was 0.76. Two research questions were raised by the researchers and answered using mean and standard deviation scores while two hypotheses were formulated and tested using t-test statistic. The findings from the study revealed that collaborative learning strategy was effective in enhancing students' performance in Physics. The study also found out that there was a significant difference in retention level between the students taught Physics with collaborative learning strategy and these students taught Physics with conventional teaching strategy. The study recommend for the adoption of collaborative learning strategy in teaching and also advocate for training and retraining of the teachers on effective utilization of collaborative learning strategy for quality education.

Introduction
The concerned of any nation is to give quality education to her citizens. All stakeholders in education deem it necessary to see that all citizens are given the best knowledge in order to allowed the nation develop scientifically and technologically. Science is the study of nature, science provides platform for any scientific and technological development of any nation. Science is viewed as an activity culminating into testable, falsifiable and verifiable body of knowledge (Dosumu, Olutola & Adeniji, 2015). Hence, science can be recognized as a force behind any country's technological advancement but also as a means of national sustainability. Since consists of Biology, Chemistry, Physics and Mathematics, mention a few.

Physics been one of the natural sciences, it is one of the basic science subjects taught in our secondary schools in Nigeria, since this level is the foundation of the study of Physics, it is to have solid foundation laid, therefore, there is need for various pedagogies to be used to enhance the performances of science students. Physics plays an important role in the technological development of any nation. For the proper understanding of technical and indeed technological subjects, Physics plays a major role. Physics is regarded as the most fundamental of all sciences which cuts across all fields of human endeavor (Serway and Jewett, 2014). Danjuma (2008) observed that Physics as the soul of sciences plays a vital role in all human endeavours and serves as a pre-requisite for courses like medicine, geology, computer engineering among others. Nelkon (2013) defined Physics as a subject which studies the properties of matter and its behavior in relation to energy. Physics is the most basic of science and its concepts and techniques underpin the understanding of all other branches of sciences. Danjuma (2017) stressed that Physics enable anyone who study it to learn certain useful scientific skills like observations, taking measurements, using various instruments such as meter ruler, spectrometer, chemical/beam balances, stop watches or clocks, thermometers,

Ammeters, voltmeters, among others, these skills enables individuals to become self-reliant, wealth creator and entre pruner in the society.

Collaborative learning and Cooperative learning are two terms used inter changeably and are treated as synonymous. Collaborative and Cooperative learning are learning instructions in which peers work together on a learning task, with the goal of all learners being to benefit from the social interaction. Collaborative learning teams are said to attain higher level thinking and preserve information for longer times than students working individually (Jenna et al, 2009). Mamman and Isah (2014) viewed that Collaboration is a learning process, if that it is managed correctly; it is powerful tool that can allow educators to impart new ideas and information's to both small and large groups. Research by Chianson et al, (2011) suggests that student who worked collaboratively on computational problems earned significantly higher scores than those who worked alone. Students with lower levels of achievement improved when working in diverse groups. Also, students working in collaborative group tend to be more intrinsically motivated, intellectually curious, caring of others and psychologically healthy (Abdulrrahim et al 2005). Collaborative learning seeks to promote cooperation and interaction between students and removes the negative trend of competition among them. This leads to a kind of the individuality, disincentives and lack of participation with others (Miriam, 2011).

Many teachers and the whole school system have adopted cooperative as the primary structure for classroom learning (Abdullahi, 2009). Thus, the present study adopted cooperative learning structure as part of the collaborative in the classroom instruction.

The educational specialists (Abdullahi, 2009) have pointed out some important aspects to be considered when Collaborative (Cooperative) learning is used, these include:

(i) Groups of students should be heterogeneous as much as possible.
(ii) Teachers and students should prepare individual and collective objective clearly and concisely.
(iii) Determine of what is required to be done by everyone in each group.
(iv) Motivating superior individuals and groups.
(v) Distributing students in small group of (6 – 12) students.
(vi) The dialogue and debate within the group should be face to face.
(vii) The teachers' role should be guidance and counseling. The researchers adopted these conditions during the treatment of the experimental group.

Conventional Teaching Strategy (CTS) in the other hand is sometimes referred to as traditional method of teaching. It is the traditional method of teaching that is talk-chalk method of teaching in which the teacher does most of the talking, while the student listens and take down notes. The method is less tedious, save time and provides fascinating and aesthetically stimulating experience especially for the new students on the topic of interest (Salisu, 2012).
Teaching is more than imparting of knowledge. It includes attempt to assist someone to acquire or change some skills, attitude, knowledge, idea or appreciation. In the same vein Ahmad, (2016) stressed that functions of the teachers includes classroom management, class unity, giving security, development of school community relationship, participating in school professional activities. The researchers viewed that, it is necessary that all these functions of teaching be fully put into consideration for the achievement of teaching and learning of the scientific concepts and choice to study the impact of Collaborative Learning Strategy (CLS) on performance in Physics at secondary schools in Niger State.

Dosunme, Olutola and Adeniji, (2015) opined that the reoccurring and persistent poor performance of Senior Secondary School Students in science subjects has been a major concern of government, parents and all other educational stakeholders in Nigeria.Poor performance can make the students' to be frustrated and later drop out from the school. Some of this drop out students may become nuisance in the society and disturbing the peace of the society. The researchers undertake the study to found out if there will be enhancement in performance in Physics at secondary schools by using Collaborative leaving strategy in order to reduce the number of drop out students at this level.

Retention has been seen as how much of the learnt items can be remembered long after the learning has taken place. Retention is the ability to preserve and later remember information or knowledge gained after learning. It is the ability to store what is learnt in memory and consequently remember them at a later time. Oladipo (2005) observed that retention can be measured through verbal recall or reproduction of learnt materials. Retention of concepts learnt help in reflective thinking and the use of the retained concepts could be helpful in creating ways to solve novel problems. According to Ahmad, (2010), retention is the ability to retain and later recall information or knowledge gained after learning. Rose (2018) found that Computer game strategy enhanced the retention ability of Physics students better than the expository strategy. This study sort to found out if the Collaborative learning strategy will enhance the retention level of Physics concepts by students in secondary schools of Niger State.

Statement of the Problem

Generally, poor performance of students in the science subjects has been a subject of concern to many stakeholders in education (Danjuma, 2015). In Nigeria, despite the enormous importance of Physics to the development of a nation and the efforts of the government and other stakeholders in improving science education, students' results in Physics in most externally organized examinations such as Senior School Certificate Examination (SSCE) have not been satisfactory (WAEC, 2015). Some researchers has attributed the unsatisfactory results to many factors which include utilization of inappropriate methods of instruction in schools and the dearth of qualified and experienced Physics teachers in secondary schools (Boyo, 2010; Mankilik and Josiah, 2013; Sule and Mankilik, 2015). In the teaching and learning of sciences both at secondary and tertiary levels, students learn to work with concepts, laws and formulae that have been taught. They are expected to learn to use such concepts, laws and formulae in solving problems. Above all, to achieve all these in teaching and learning there is need to use various pedagogical strategies to provide enabling environment for the students. This study is concern on pedagogy that the teachers could use to enhance the performance and retention in Physics at secondary schools.

Okoronka and Wada, (2014) stressed that the most important factor which has significant effect on students' performance is the instructional strategy that is pedagogical method adopted. For quality education to be achieved, the Physicsteacher needs to use the appropriate pedagogical strategies that will enhance performance and retention in Physics at secondary schools. The researchers chose to investigate whether Collaborative learning strategy will enhance performance and retention level in Physics students at secondary schools.

Purpose of the Study

The purpose of the study is to determine the impact of Collaborative learning strategy on performance and retention in Physics at secondary schools. Specifically, the study determined:

(i) Whether students who were taught Physics using Collaborative Learning Strategy will perform better than those taught Physics using Conventional Teaching Strategy.

(ii) Whether students who were taught Physics using Collaborative Learning Strategy will retain more of concept learnt than those who were taught Physics using Conventional Teaching Strategy.

Research Questions

(i) What is the difference in the level of performance between SS II students taught Physics using Collaborative learning strategy and those taught Physics using Conventional teaching strategy?

(ii) What is the difference in the level of retention between SS II students taught Physics using collaborative learning strategy and those taught Physics using conventional teaching strategy?

Hypotheses

The following null hypotheses were formulated and tested at $P \leq 0.05$ level of significance.

Ho_1: There is no significant different in the level of performance between SS II students taught Physics using Collaborative teaching strategy and those taught Physics using Conventional Teaching Strategy.

Ho_2: There is no significant different in the level of retention between SS II students taught Physics using Collaborative teaching strategy and those taught Physics using Conventional Teaching Strategy.

Scope of the Study

The study was delimited to two public secondary schools in Bida Local Government which are Ndayko Day Secondary School and Eyagi Day Secondary School Bida. The public schools were selected for the study because they were averagely the same. The variables covered were Conventional Teaching Strategy performance and retention. The test used was Physics Achievement Test (PAT) which contained 40 objective questions. The Physics concepts taught in the study was delimited to work, energy and power.

Methodology

The researchers adopted quasi-experimental design for the study, as described by (Sambo, 2008). The study has two (2) groups that were pretested to ascertain their homogeneity. The experimental group was exposed to treatment (Collaborative Learning Strategy) and the Conventional Teaching Strategy was used for control group. The researchers randomly assigned intact classes to experimental and control groups. This was necessary in order not to disrupt the normal classes of the students and the school time-table. The use of intact class in a quasi-experimental design and this kind of procedure could be utilized if it is not feasible for the researcher to randomly sample the experimental subjects and allocate them to instructional teams without disruption of the normally existing instructional schedule of the students and institutions (Sambo, 2008).

The target population of this study was all the public secondary schools two (SS II) Physics students in Niger State. The state public schools were considered, mainly due to their common socio-economic background, admission and promotion policy, staffing and availability of instructional materials.

The researchers used random sampling techniques to assign one school as the experimental group and other served as control group. The sample for the study was made up of total of two hundred and forty-five (245) SS II Physics students. 120 students was for experimental group taught Physics with Collaborative Learning Strategy and 125 students known as control group among Physics with Conventional Teaching Strategy. The instrument used for data collection

was Physics Achievement Test (PAT). The instrument was validated by three research experts. The reliability of the instrument was determined using the Pearson Product Moment Correlation Coefficient to be 0.76. Mean and Standard Deviation were used to answer the research questions while test of hypotheses were done with t-test at $P \leq 0.05$ level of significance.

The two groups were pre-tested using PAT before treatment. Thereafter, the treatment was administered for a period of six weeks. The experimental group were taught Physics using Conventional Teaching Strategy while the control group were taught the same topics using Conventional Teaching Strategy. At the expiration of the treatment period, the PAT was re-administered to all the groups as post-test. After two weeks of post-test, PAT was further reshuffled and re-administered on the two groups for retention scores. Two weeks gap was given between the tests because the researchers assumed that after two weeks the students may have forgotten the items in post-test (Mamman and Isah, 2014).

Results

Research Question One: What is the difference in the level of performance between SS II students taught Physics using Collaborative Learning Strategy and those taught Physics using Conventional Teaching Strategy?

Table 1: Post-Test: Mean Performance and Standard Deviations scores of Experimental and Control Groups.

Groups	N	Mean	S.D	Mean Difference
Experimental Group	120	50.47	14.94	
Control Group	125	32.27	16.55	18.20

The data presented in Table 1 shows that the experimental group had a mean score of 50.47 and the control group had mean score of 32.27. The means difference was 18.20 in favour of experimental group (Collaborative Learning Strategy) due to the treatment.

Research Question Two: What is the difference in the level of retention between SS II students taught Physics using Collaborative Learning Strategy and those taught Physics using Conventional Teaching Strategy?

Table 2: Post-test: Mean Retention and Standard Deviations scores of Experimental and Control Groups.

Groups	N	Mean	S.D	Mean Difference
Experimental Group	120	50.00	16.17	
Control Group	125	32.44	11.59	17.56

In Table 2, the result shows that the experimental group had a mean score of 50.00 and the control group had a mean score of 32.44. The mean difference of 17.56 in favour of the experimental group due to the treatment.

Hypotheses One

Ho_1: There is no significant different in the level of performance between SS II students taught Physics using Collaborative Teaching Strategy and those taught Physics using Conventional Teaching Strategy.

Table 3: t-test Analysis of Performance of Experimental and Control Groups in Post-test

Groups	N	Mean	S.D	DF	t-cal	p-value	Remark
Experimental Group	120	50.47	14.96				
Control Group	125	47.14	16.55	243	9.02	0.00	Sig

It was observed in Table 3 that there was significant difference in the performance scores of students in the experimental group (Collaborative Learning Strategy) and control group (Conventional Teaching Strategy). The result indicated that there was significant difference in the performance mean scores of the two groups. Hence the null hypothesis was rejected.

Hypothesis Two

Ho_2: There is no significant different in the level of retention between SS II students taught Physics using Collaborative Teaching Strategy and those taught Physics using Conventional Teaching Strategy.

Table 4: t-test Analysis of Retention Level of Experimental and Control Groups in Post-posttest.

Groups	N	Mean	S.D	DF	t-cal	p-value	Remark
Experimental Group	120	50.00	16.17				
Control Group	125	32.44	11.59	243	9.81	0.00	Sig

In Table 4, the results revealed that there was significant difference in the retention level of the student in experimental group than control group as recorded by P-value (0.00) is less than alpha 0.05 level of significance. That confirmed that there was significant difference in the post-posttest scores of the two groups and the null hypothesis was rejected.

Discussion of Findings

The Collaborative learning strategy was found to more effective in learning Physics concepts than the conventional teaching strategy. This can be attributed to the learner-centrednature of CLS and its advantage of hands-on and cooperation in groups to undertake given tasks. This finding was in agreement to those of Chianson et al (2011), Mamman and Isah (2014), Ahmad (2016) who found out that collaborative learning strategy of instruction is more superior, in terms of the students' performance, to the Conventional teaching strategy. Also, there was significant difference in the retention level in posttest mean score of the students taught with Collaborative learning strategy than the conventional teaching strategy, it implies that students taught Physics concept with Collaborative learning strategy have the ability of retain more concept taught than those students taught Physics concepts with conventional teaching strategy which is in support of the findings of Oladipo (2005), Ahmad (2010), Rose (2018), they examined differently that the students have the ability of retaining more concepts in science subjects when the instructional pedagogies used is learner-centre strategy.

Conclusion

In the light of the availability of numerous pedagogical strategies of teaching and learning science subjects for quality education it therefore becomes paramount for the teachers of Physics to exploit innovative modern pedagogical techniques such as the use of Collaborative Learning Strategy. It is against this back drop that this study was carried out strengthening collaborative learning strategy on performance and retention in Physics for quality education.

The study found out that Collaborative learning strategy was effective in enhancing students' performance and retention level in Physics.

These findings are confirmation of the fact that the use of innovative pedagogical strategies is a viable teaching method for quality education, which is not only capable of improving the students' performance but it is also capable of stimulating their interest in learning and above all, enhance their learning retention. Conclusively, it therefore implies that adopting these instructional approaches in teaching and learning is an assurance of producing competent, qualified graduates that will teach Physics and also keep up with the rapid scientific and technological advancement of the nation.

Recommendations

Based on the findings of the study, the following recommendations were made:

(i) The Principals of the schools under study should adopt the use Collaborative learning strategy in teaching.

(ii) The School Administrators should mount capacity building programme for the teachers on Collaborative learning strategy.

(iii) Government should develop appropriate frame work necessary for encouraging the adoption of innovative pedagogies to enhance quality education.

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INFLUENCE OF STUDENTS' VARIABLES ON SENIOR SCHOOL STUDENTS' PERFORMANCE IN PHYSICS IN GWAGWALADA AREA COUNCIL, ABUJA, NIGERIA

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Abstract
This study investigated the influence of students' variables on senior school students' performance in physics in Gwagwalada Area Council, Abuja, Nigeria. This study was a descriptive research of the survey type. The population consisted of all senior secondary school students in Gwagwalada Area Council Abuja. The sample for the study was drawn using random sampling technique to select 4 schools out of the 19 senior secondary schools. Intact physics classes of 300 senior secondary school II students (SSSII) participated in the study. The instruments used for the study were the researcher's designed questionnaire and the students' school examination results. The instruments were validated by two lecturers from the department of science education university of Ilorin and two physics teachers teaching in senior secondary schools in Abuja. Three research questions were raised and answered in this study. Chi square statistics was used to answer the research questions at 0.05 alpha level. The study revealed that family background, study habits and peer group have significant influence on the academic performance of students. The study concluded that family background, study habits and peer group influence students academic performance in physics.

Keywords: Academic Performance, Students' variables, Family background, Study habits, Peer Group

Introduction

The application of the knowledge of science is the basis upon which the physical and technological advancement rest. It is a potent tool in the development of any nation. Science is a body of knowledge, a way of investigating, and way of thinking in pursuit of an understanding of nature (Abimbola & Omosewo, 2006). Bradford (2015) defined science as a systematic and logical approach to discovering how things in the universe work and an accumulated body of knowledge by which things in the world were made. It is the foundation of scientific and technological breakthrough in any nation of the world. It is in this light that the Federal Republic of Nigeria FRN (2013) mandated in the National Policy on Education the promotion of science as a means for technological development.

Education is the best legacy parents can give to their children. The development of the nation starts from the family. When the family succeeds in teaching and impacting good values in their children, the country becomes a better place to live. It is generally believed that the basis for any true development must commence with the development of human resource. Formal education is the demonstration of such desires to effectively and efficiently build a sound and strong economy. Societies all over the world strive to achieve quantitative education for her citizenry. In order to achieve this noble course, so many factors must be put into consideration. Among them is the family background of the child. The family has a great role to play on the overall development of the child and his educational upbringing in particular.

The family is a social unit in any society and it is the source of early stimulation and experience in children (Collins, 2007). The home influences the child at the most earliest possible time of

his life at a time when his mind is most receptive. It provides the first impression which may last through the whole life of the child. The child often sees the parents, siblings and things in their immediate environment to be most significant and they are capable of promoting or diminishing him in self worth and academic performance (Ekanem, 2004).

The environment is the immediate surrounding in which the pupils find themselves. It is also referred to as the physical and psychological conditions that affect children (Ogbemudia & Aiasa, 2013). The parents or guardian of the students are responsible for providing the right home environment that will facilitate effective learning for their wards. Furthermore, in pupil's home environment, some factors that influences their academic performances include: parental educational background, occupation, economic status, marital status and home location; family size and peer group. The size of the family in which a child grows affects his intellectual development; this is because in a large-size family, a child may not be given the required attention especially in his/her academics as the family will have more persons to cater for. The issue of home works, payment of school fees, attending parent teachers associations and many more may not be convenient for the parents as they have to cater for many children, while children are well catered for and perform better in small-size family (Udida, Ukwayi & Ogodo, 2012).

Low income of parent is a major impediment to academic success and development on the part of the students. Student's academic performance can be predicted by a chain of social-economic factors resident in parents, family and network (Mohammed, Yinusa & Akanle, 2008). The family has the potential to influence a child's academic performance. This is because it is the first environment of the child. The initial experience that would mold the child's values, aspirations, emotions, interest and attitudes are offered by the parents/family (Okeke, 2009). Indeed, family background is the foundation for children's development, as such family background in terms of family type, size, socio-economic status and educational background play important role in children's educational attainment and social integration (Osunloye, 2008; Ushie, Emeka, Ononga & Owolabi, 2012).

In every school setting, students are perpetually in search of academic success. Student's academic performance occupies a very important place in education as well as in the learning process. It is considered as a key criterion to judge one's total potentialities and capacities (Nuthana & Yenagi, 2009) which are frequently measured by the examination results. It is used to pass judgment on the quality of education offered by academic institutions.

Academic performance is an important parameter in measuring success of students. Observations and reports have shown that success or high academic performance has become a serious task to accomplish by students in recent times. Poor academic performance are recorded both at the secondary and tertiary levels of education in Nigeria (Tenibiaje, 2009). The academic performance of students at all levels in educational institutions in Nigeria has attracted much criticism from all and sundry from time immemorial. According to Nwokocha and Amadike (2005), academic performance of students is the yardstick for testing educational quality of a nation. Hence, it is expedient to maintain a high performance in internal and external examinations. Therefore, academic performance to a great extent is a function of students' study habits. So to enhance education, it becomes necessary to improve study habits of students. Globally researchers revealed that a relationship exists between study habits and academic performance (Bashir & Mattoo, 2012; Kurshid, Tanveer & nas Quasmi, 2012).

Study habits are students' ways of studying whether systematic, efficient or inefficient (Ayodele & Adebiyi, 2013), implying that efficient study habits produces positive academic performance while inefficient study habits lead to academic failure. Positive academic performance and achievement depends upon the student's ability to schedule his time, the plan of his study, the habit of concentration, note–taking, mental review, over learning, and so on. In other words, positive academic performance is a function of proper study habits and skills. Since study habits are an important factor in learning, it becomes necessary to investigate into its nature. However, while investigating the family background of the child and the study habits, there is need also to identify and analyze other factors that can affect academic performance. One of the variables that could possibly affect academic performance is the child's peer group.

Peer group is defined as a small group of similarly aged; fairly close friends, sharing the same activities. In general, peer groups or cliques have two to twelve members, with an average of five or six. Peer effect is an important component in determining student outcomes (Castrogiovanni, 2003). A typical student learns from discussions with his peers affected by their personality and attitude towards learning. Peer students can also be motivated by working together. It is well established that the quality of peers could affect a wide range of student outcomes from school performance (Hanushek, Kain, Markman, & Rivkin 2003; Cooley, 2010; & Jan, 2013).

Statement of the Problem

There have been decline of students' academic performance in physics at secondary school level of education (Adeyemo, 2010). Although, several scholars have proposed various factors responsible for the poor performance of students. The study of Osa-Edoh and Alutu (2012) which examined the usefulness of imbibing in the students study habit, as a means of enhancing their academic performance, revealed a high correlation between study habits and students academic performance. This suggests that it is only when students imbibe or cultivate proper study habits that their academic performance can be improved upon.

In a research carried out by (Nuthana & Yenagi, 2009), the causes of poor academic performance among Nigeria students were thoroughly examined. Some of these factors identified include; low student's intellectual ability, achievement motivation, lack of goals, low self-esteem, low socio-economic status of the family, poverty and poor study habit as a major factor. Similarly, Nuthana and Yenagi (2009) found significant correlation between study habits and academic achievement. It further revealed that reading and note-taking habits, habits of concentration, and preparation for examination had significant correlation with academic achievement.

Moreover, a literature review by Nagaraju (2004) pointed out that, for good academic success, good study habits and attitudes are important. Hence, it is imperative and desirable that a probe into the pattern of study habits and attitudes of students be made. Awodun, Aladejana and Oni (2014) worked on students' as predictor of secondary school students' performance in physics. These authors observed students' variables like study habits, attitude, interest of students in physics and also gender of the students. From their investigation, they observed that study habit, attitude to and interest of students in physics are better predictors of students' performance in physics, while student gender has no influence on students' academic performance (is a poor predictor).

The home environment or family background of learners also affects their academic performance. (Ajila & Olutola, 2007) worked on the influence of home environment on the

academic performance of secondary school students in Nigeria. This study examined the impact of parental involvement on the academic performance of secondary school students. These authors observed that there is significantly positive correlation with a good home environment and academic performance of students. The research contents that parental involvement at all grade levels can assist in the academic and behavioural performance of students. Akpan, Odidi and James (2016) examined students' academic achievements in social studies: any peer group influence? The result shows that there was a significant positive relationship between peer group influence and students' academic achievements in Social Studies.

Although, the findings of the researchers showed that variables such as family background, study habits, interest, attitude, and peer group were investigated but none of these studies investigated all the variables at once and most of them were not carried out in Gwagwalada Area Council, Abuja. Therefore this study, will investigate the influence of students variables (family background, study habit and peer group) on senior school students performance in physics in Gwagwalada Area council, Abuja, Nigeria.

Research Questions

The following research questions were answered in this study:
What is the influence of:

(i) family background on students' academic performance in physics?
(ii) students' study habits on their academic performance in physics?
(iii) peer group on students' academic performance in physics?

Scope of the Study

This study was limited to all the senior secondary schools in Gwagwalada Area Council, Abuja, Nigeria. All the SS2 physics students in all the senior secondary schools constituted the sample for the study. The SS2 students were chosen because of their experience in learning physics for the past 2 years and also it was not an examination class. There are nineteen (19) senior secondary schools in Gwagwalada Area Council, Abuja, according to Area council report 2017. 4 schools (2 private and 2 public schools) were selected by simple random sampling and physics intact classes were used which comprised of 300 students. The senior secondary schools, both public and private schools and the no of their (SS2) Physics students involved in this study

Methodology

Research Type: This was a descriptive study of the survey type. It was aimed at investigating the influence of students' variables on senior school students' performance in physics in Gwagwalada Area Council, Abuja, Nigeria. The data that was gathered from students of all the participating schools, through questionnaire was used to determine the influence of students' family background, study habits and peer group on the academic performance of students in physics in senior secondary schools in Gwagwalada Area Council, Abuja, Nigeria.

Population, Sample and Sampling Techniques: The population for this study involved all senior secondary schools students in Gwagwalada Area Council Abuja. The target population was all the senior secondary two (SS2) physics students in all the senior secondary schools in Gwagwalada Area council, Abuja. Simple random sampling technique was used to draw 4 schools (2 private and 2 public schools) from the 19 senior secondary schools in Gwagwalada Area Council, Abuja according to Area Council Report 2017. Intact classes which involved 300 SS2 physics students constituted the sample for this study. The SS2 students were chosen

because of their experience in learning physics for the past 2 years, their maturity more than the SS1 students and more so, it's not an examination class.

Research Instrument: The instrument that was used for this study was the researcher's designed questionnaire. The questionnaire had two sections, A and B. Section A contained items on personal information about the students, while section B contained items on variables that influence students' performance such as family background, study habits and peer group where the students can indicate whether he/she Agree (A), Neutral (N) or Disagree (D)

Validation of Research Instrument: The research instrument for this study was validated through the help of two lecturers who are physics education experts in the Department of Science Education, University of Ilorin, Ilorin and two experienced physics teachers in secondary schools. Modifications and contributions made were exploited for the face and content validity of the instrument. The instrument was subjected to test-re-test method, the instrument was trial-tested on forty students from a non- participating school, after 2 weeks, the instrument was administered again on the same students and Pearson product moment coefficient (PPMC) was used to determine the coefficient index. The coefficient index of the instrument was 0.78 which makes the instrument reliable for the study.

Procedure for Data Collection: Firstly, the researcher visited all the schools where the study was carried out and asked for the permission from the authority of the sampled schools by meeting them and giving them an introductory letter, on the need to engage the students in the research study. Copies of an informed consent form were given to the students for endorsement by their parents. This was to indicate the parents' willingness to allow their children/wards voluntarily participate in the study

Data Analysis Techniques: The data collected was analyzed using descriptive statistics. All the research questions were answered using chi square and percentages.

Results

Research Question One: What is the influence of family background on students' performance in physics?

Table 2: Showing Result for Chi-square Statistics on Influence of Family Background towards Physics

Family Background	Observe Frequency	Expected Frequency	df	x^2	P	Remark
1. I perform well in school because I live with my parents						
Agree	167					
Neutral	88	99.3	297	79.336[a]	.000	Significant
Disagree	43					
2. Your parents' financial status affects your academic performance						
Agree	74					
Neutral	36	99.3	297	125.987[a]	.000	Significant
Disagree	188					
3. I offer physics as a subject because my parents want me to become an engineer or a doctor.						
Agree	16					
Neutral	84	99.3	297	170.282[a]	.000	Significant
Disagree	198					
4. I cannot comprehend well in school because I don't take my breakfast before going to school.						
Agree	19					
Neutral	41	99.3	297	292.799[a]	.000	Significant

Disagree	238					
5. I'm doing well academically because I live with my father and not my mother.						
Agree	29					
Neutral	71	99.3	297	155.886[a]	.000	Significant
Disagree	198					
6. Students' educational attainment could suffer if their tuition fees are not paid promptly.						
Agree	191					
Neutral	71	99.3	297	133.054[a]	.000	Significant
Disagree	36					
7. Students' whose mum and dad have separated find it difficult to pay their fees						
Agree	145					
Neutral	103	99.3	297	45.631[a]	.000	Significant
Disagree	50					

Table 2 shows results of chi-square statistics on influence of family background towards physics with Chi-square average value [$x^2(297) = 143.2821$; $p=0.00$]. The result shows significant relationship across all the questions in table 1 as the p-values of each question was less than 0.05 significant level. This implies that students' family background had strong influence towards understanding physics.

Research Question Two: What is the influence of students' study habits on their performance in physics?

Table 3: Showing Result for Chi-square Statistic on Influence of Study Habit towards Physics

Study Habit	Observe Frequency	Expected Frequency	df	x^2	p	Remark
8. I study the "tough" subjects when I am most alert.						
Agree	142					
Neutral	115	99.3	297	55.054[a]	.000	Significant
Disagree	41					
9. I review my class notes within one day after the class in which they were taken.						
Agree	160					
Neutral	112	99.3	297	92.805[a]	.000	Significant
Disagree	26					
10. At the start of each week, I carefully plan my study schedule for the week.						
Agree	249					
Neutral	36	99.3	297	340.919[a]	.000	Significant
Disagree	13					
11. Preparing ahead of class help students to understand more concepts in physics						
Agree	270					
Neutral	25	99.3	297	206.389[a]	.000	Significant
Disagree	3					
12. Students who read their physics notes only when having test or exam always perform better						
Agree	78					
Neutral	61	99.3	297	55.215[a]	.000	Significant
Disagree	159					
13. Students who study their physics notes and text books always perform better						
Agree	243					
Neutral	31	99.3	297	311.926[a]	.000	Significant
Disagree	24					

14. When I am learning material, I ask myself questions and study until I can give the answer, on two or three separate occasions, without looking at the text or my notes.						
Agree	201					
Neutral	91	99.3	297	192.450[a]	.000	Significant
Disagree	6					

Table 3 displaying results of Chi-square statistics on influence of study habit towards physics with Chi-square average value [$x^2(297) = 179.2511$; $p=0.00$]. The result shows that there was a significant influence across all the questions in table 1 as the p-values of each question was less than 0.05 significant level. This implies that students' study habit had strong positive influence towards understanding physics by students, this is because most of the questions in table 3 have higher Agree expected frequencies except for question no. 8 whose disagree is more than its agree. Therefore, it can be concluded that students' positive study habit had great influence towards physics.

Research Question Three: What is the influence of peer group on students' academic performance in physics?

Table 4: Showing Result for Chi-square Statistic on Influence of Peer Group towards Physics

Peer Group	**Observe Frequency**	**Expected Frequency**	**df**	x^2	**p**	**Remark**
15.Students who don't like reading with their mates perform better in physics						
Agree	48					
Neutral	127	99.3	297	39.872[a]	.000	Significant
Disagree	123					
16.I read physics whenever my friends are reading theirs						
Agree	18					
Neutral	59	99.3	297	31.993[a]	.000	Significant
Disagree	221					
17.Students who don't like going for physics lessons are always ahead of the class						
Agree	67					
Neutral	17	99.3	297	211.134[a]	.000	Significant
Disagree	214					
18.Students who keep good friends perform better in physics						
Agree	167					
Neutral	46	99.3	297	76.799[a]	.000	Significant
Disagree	85					
19.Students who spend most of their time chatting with friends without reading perform better in physics						
Agree	66					
Neutral	31	99.3	297	162.248[a]	.000	Significant
Disagree	201					
20.Students interactive section has aided their improvement in physics						
Agree	186					
Neutral	72	99.3	297	118.575[a]	.000	Significant
Disagree	40					
21.Students work actively when given assignment with their peers						
Agree	205					
Neutral	89	99.3	297	48.322[a]	.000	Significant

Disagree	4

Table 4 shows chi-square analysis on influence of peer group towards physics with Chi-square average value [x^2(297) =98.4204; p=0.00]. The result reveals that significant influence exists across all the questions in table 3 as the p-values of each question was less than 0.05 significant level. This implies that students' peer group had strong influence towards the understanding of physics.

Discussion

This study investigated the influence of students' variables on senior school students' performance in physics. Findings of the study revealed that students' variables (family background, study habits and peer group) have positive influence on students' academic performance in physics. The findings indicated that family background of students has positive influence on their academic performance in physics. This finding is in agreement with Adeyemo (2010); that background and classroom correlates have influence on students' achievement in physics, Dzever (2015); revealed a positive and significant relationship between permissive parenting style with academic performance, Azhar, Nadeem, Naz, Perveen and Sameen (2013) revealed that parental education had significant effect on academic achievement while Ushie, Emeka, Ononga and Owolabi (2012) revealed that parental socioeconomic background significantly influence students' academic performance.

However, this finding is contrary to that of Osuafor and Okonkwo (2013); Ebong (2015); which revealed that family structure, parents' occupation and educational level of parents did not have significance influence on students' performance. In other words that family background does not have influence on students' performance.

Furthermore, this study also found that that students' study habit had positive influence on their academic performance in physics. This finding is in agreement with Onuekwe (2015); Roya and Venkatesha (2016); Siahi and Mayo (2015); Ogbodo (2010); Kalaivani and Babu (2011) which revealed positive influence between students' study habits and their academic performance.

Finally, this study also found that peer group had positive influence on the academic performance of students' in physics. This finding is in agreement with Akpan, Odidi and james (2016); Korir and Kipkemboi (2014); which revealed that there was a significant positive relationship between peer group influence and students' academic performance. Moreso, Bankole and Ogunsakin (2015) revealed that peer relationship, socialization, location, motivation and drug use have a great influence in determining academic performance of secondary school students.

Conclusion

Based on the findings of this study, it was revealed that students' variables play an important role in the academic performance of secondary school students. It was concluded that students' family background, students' study habits and peer group are some of the variables that positively influence students' academic performance in physics.

Recommendations

The following recommendations are considered relevant based on the findings of this study:

(i) Government/Organizations should provide welfare/ scholarships for students from poor family background whose parents cannot pay their fees so as to retain them in school to improve them academically.

(ii) The school authorities and policy makers also need to engage the parents constructively and build relationships between the school, the home and the government agencies in charge of education to harness the ability of parents to foster better academic achievement of their children. Therefore, traditional mechanisms such as PTA meetings need to be strengthened to include sensitization sessions to build the parents capacity to play their role in the learning process of their children.

(iii) Parents should provide enabling home environment to suit the purpose of their children's academic pursuit. They should equally provide them with emotional support to ensure emotional stability and confidence in the children.

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COOPERATIVE LEARNING – AN INNOVATIVE PEDAGOGY FOR ENHANCING QUALITY EDUCATION AMONG UNDERGRADUATE SCIENCE EDUCATION STUDENT

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Abstract
This study employed a descriptive survey design. The population of the study is the undergraduate science education student for the 2015/2016 and 2016/2017 Academic Session respectively. The sample is made up of 110 students, thirty (30) students in 2015/2016 and eighty one (81) in 2016/2017 session. A validated instrument titled the cooperative learning attitude questionnaire was used to generate the data for the study. Data was analyzed using the mean, percentage and Mann Whitney statistical analysis. Result revealed that 79.37% and 86.67% of the student in 2015 / 2016 and 2016/2017 sessions respectively agreed that cooperative learning instructional strategy was novel to them. The mean attitude scores for students in 2015/2016 and 2016/2017 are 3.079 and 3.082 respectively. The result also revealed no significant difference between the attitude of students in 2015/2016 session and the 2016/2017 session. It was concluded that the student showed positive attitude to cooperative learning instructional strategy. It was recommended that Faculty should encourage lecturers to use cooperative learning instructional strategy in teaching the undergraduate science education students.

Keyword: Innovative Pedagogy, Quality Education, Undergraduate Science Education

Introduction
While agriculture, medicine, science, and transportation, as well as manufacturing and communication sectors have all been transformed and improved, teaching relatively has not(Johnson&Johnson,2013).The authors maintained that, the same assumptions continue that teaching is telling, learning is absorbing what the instructor tells, and knowledge is subject matter content.

The above assertion suggests there is little or no innovation in teaching science.Innovation according to Lorenzo (2010) isthe introduction of something new and useful. It is the embodiment, combination, or synthesis of knowledge in original, relevant, valued new products, processes, or services.The author explained that Invention is the first birth of an idea for a new product or process, while innovation is the first attempt to carry it out into practice – as a result, it can be said that all innovation begins with creative ideas. Therefore, according to Lorenzo (2010), Innovation can also be seen as the successful implementation of creative ideas within an organization. In other words, creativity by individuals and teams is a starting point for innovation. Every organisation (this includes our schools and universities) need a touch of innovation to survive. In the word of Lorenzo (2010), Innovation is the lifeblood of any organization and without it, not only is there no growth, but, inevitably, a slow death. A critical look at Nigeria system of education, one can boldly say that there is a need for innovative touch. Education, according to Eze(2017) can be describe as an activity which goes on in a society and its aims and methods depend on the nature of the society in which it operates. It is

dynamic and depends on time, place and circumstance. This is because it is constantly changing, adapting itself to new demands. Therefore it can deduce that quality education cannot be possible without a touch of innovation or introduction of a theoretically validated practice. Supporting this claim earlier, Abubakar (2017) maintained that, with the social, economic, political and technological distraction, there is the need for a sound pedagogical practice for a meaningful learning to occur inour lecture rooms. Undoubtedly, quality education can only be realized for the populace if the classroom instructional strategy affects our students' attitude positively. This calls for the utilization of innovative and interactive instructional strategy.In other word, quality teaching leads to quality education. According to UNICEF (2000)**,** Quality education includes, processes through which trained teachers use child-centered teaching approaches in well-managed classrooms and schools and skillful assessment to facilitate learning and reduce disparities.

Operationally, quality education here is define as one that affects not only the cognitive but leads to the development of skills like self-management, team work, communication, conflict resolution and positive attitude. It is here posited that, a sound pedagogical practice like cooperative learning can enhance positive attitude in the students toward learning generally. Cooperative learning according to Orlich et al (2010) is learning based on a small-group approach to teaching that holds students accountable for both individual and group achievement. Lam (2013), defined Cooperative learning as a student-centered, instructor-facilitated instructional strategy in which a small group of students is responsible for its own learning and the learning of all group members. Therefore, this study seeks to explore the attitude of undergraduate science education students toward Cooperative Learning Instructional Strategy.

Research Questions

(i) How novel, to the students was cooperative learning instructional strategy?
(ii) What is the difference between the attitudes of students in both sessions toward cooperative learning instructional strategy?

Research Hypothesis

(i) There is significant difference between the attitude of undergraduate science education student in the two session

Theoretical Framework

Cooperative Learning is rooted in the social independence theory. This theory was initially formulated by Kurt Koffka of the Gestalt school of psychology in 1900. However, the theory was refined and extended by Kurt Lewin and Morton Deutsch. Morton Deutsch proposed in 1949 that how group members' be1ieve their goals are related very much impacts their dynamics and success. The basic premise of the social independence theory is that the type of independence structured in a situation determines how individuals interact with each other that, in turn, largely determine outcomes. Deutsch (1949) conceptualizes three types of social interdependence,

(i) Positive interdependence (cooperation) results in promotive interaction as individual encourage and facilitate each other's efforts to learn.
(ii) Negative interdependence (competition) typically results in oppositional interaction as individual discourage and obstruct each other's efforts to achieve.
(iii) No interdependence (individualistic efforts) typically results in no interaction as individuals work independently without any interchange with each other.

According to Johnson et al.(2013), positive interdependence tend to result in promotive interaction, negative interdependence tends to results in oppositional interaction and no interdependence that result in an absence of interaction.

Attitude

What the students know about science lessons is not the only important thing but their feelings about the lesson are also important Ebenezer & Zoller 1993(cited in Akpınara, Yıldıza, Tatarb & Ergina, 2009). Attitude, according to Ayanniyi (2011) is the positive or negative evaluations of people objects, ideas or events. Attitudes are important outcomes of science education in school. The development of students' positive attitudes regarding science is one of the major responsibilities of every science teacher (Cheung, 2007).Many empirical studies emphasizes on student attitude toward a subject or a course taught. Some of the studies were presented below:

Chepkorir (2013)investigated the prevailing attitude of students towards Chemistry; the circumstances and factors that condition these attitudes were investigated and suggestions on possible remedies were given. The study used the descriptive survey research design. The target population comprised Form Four students in ten selected secondary schools in Bureti District of Rift Valley Province, Kenya. Stratified random sampling technique was used to select the respondents. Schools were selected from the following categories: Girls' schools, Boys' schools and Co-educational schools. Simple random sampling was used to select the respondents from Form Four classes as well as a teacher in each school. In all, one hundred and eighty-nine students and ten teachers were selected. The data collection instruments were questionnaires based on the Likert scale and document analysis. Data was analyzed descriptively using frequency tables, means and percentages while hypotheses were tested using Analysis of Variance. The results showed that a number of indicators revealed that there are some factors influencing students' attitudes; some of the factors are anxiety over career opportunities and peer influence.

In another study, Cheung (2007) examined the interaction effect between grade level and gender with respect to students' attitudes toward chemistry lessons taught in secondary schools. The sample consisted of 954 chemistry students in grades Secondary 4–7 (approximately 16–19 years of age) in Hong Kong. Students' attitudes were surveyed using an attitude toward chemistry lessons scale (ATCLS), and subscale scores were produced on four dimensions: liking for chemistry theory lessons; liking for chemistry laboratory work; evaluative beliefs about school chemistry; and behavioral tendencies to learn chemistry. When the ATCLS data were subjected to two-way MANOVA, the interaction effect between grade level and gender on students' attitudes toward chemistry lessons was statistically significant. The interaction effect was attributable to scores on the theory lessons subscale and laboratory work subscale. Male students in Secondary 4 and 5 liked chemistry theory lessons more than their female counterparts. However, male students' liking for chemistry laboratory work declined when they progressed from Secondary 4 to Secondary 7; no such a significant decline in attitude toward chemistry laboratory work was found in females. Overall, both males and females were just marginally positive about chemistry lessons during the years of secondary schooling. Implications of these findings for curriculum design are discussed

Nasr (2011) investigated the relation between attitudes towards science in biology courses and students' biology achievement. A total of 185 grade 12 (age 17-18 years) students in Isfahan answered to a 30-item questionnaire provided by authors based on STAQ-R inventory. The results showed that among attitude towards science dimensions, only "biology is fun for me",

have meaningful and positive relation with students' achievement in biology. Also there was no significant difference between girls and boys in attitude towards biology, although girls had better achievements in biology in comparison with boys.

Adesoji and Raimi (2oo4) in a related study, examined the effect of supplementing laboratory instruction with problem solving strategy and or practical skills teaching on students' attitude toward chemistry. A total of 286 senior secondary class II students (145 males and 141 females) drawn from four local government areas in Oyo township in Oyo state, Nigeria, took part in the study. A pretest–posttest nonrandomized control group in a quasi-experimental setting using a 4× 2× 2 factorial representation formed the design of the study. Data analysis was done by the use of analysis of covariance but Scheffe post hoc analysis was carried out in the case of significant main effect of the treatment and also in the occasion of significant interaction effect. Graphical illustrations were however used to further explain the interaction effects. The results revealed that the use of enhanced laboratory instructional strategy significantly improved the attitudes of students toward chemistry. The results underscore the need for secondary school chemistry teachers to adopt the use of enhanced laboratory instructional strategy in order to promote good attitude.

Fatoke and Olaoluwa (2014) in a study titled, Enhancing Students' Attitude towards Science through Problem Solving Instructional Strategy investigated the effect of problem-solving instructional strategy on students' attitude toward chemistry was investigated. The findings revealed that problem-solving instructional strategy influences students' attitude towards chemistry learning based on gender. Also, students' numerical ability do not have any significant interaction effect on students' attitude towards chemistry learning based on gender. It was then recommended that students' should develop a proper attitude towards problem-solving with a view to improving their performance in chemistry. Besides giving students the content, the process is equally important for them to comprehend some scientific concepts and principles. This could make them develop more positive attitude toward the learning of science.
From the above, many of the research emphasized on the attitude toward course or subject taught with only few that study the students' attitude toward the instructional strategy used. The review also indicates low empirical studies on attitude of science education students in tertiary institutions.

Methodology

The study employed a survey design. The population of the study comprises the 300 level and the 400 level science education students of the faculty of education, Sule Lamido University that registered for a faculty based core course, EDU 203, Educational Research Method in 2015/2016 and2016/2017 session respectively. There are a total of 111 that registered the course in 2015/16 and 2016/17 session respectively. Thirty (30) students in 2015/2016 and eighty one (81)in 2016/2017 session. The entire population constituted the sample of the study. A validated instrument, Cooperative learning attitude questionnaire was used to elicit respond from the students. CLAQ is a 16 items Likert scale. The reliability coefficient was calculated using Cronbach alpha as 0.08. Analysis of data was done using mean, standard deviation and percentage while the hypotheses were tested using t –test statistical analysis. The following decision were taken on the mean score:

(i) mean < 2.5 = Negative attitude,
(ii) mean of 2.5 and above = positive attitude

Results

The data generated using the Cooperative Learning Attitude Questionnaire was use to answer the research question and test the hypothesis. The results were presented below.

Research Question one: How novel was cooperative learning instructional strategy to the students in both session? The percentage was computed and the result presented in figure 1 below.

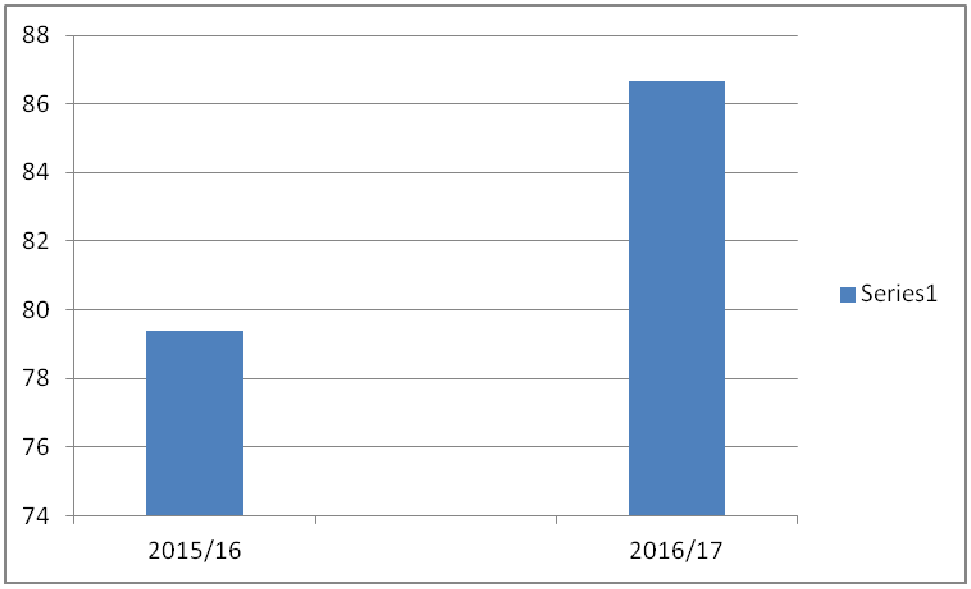

Figure 1: The percentage of students in the two sessions that agreed that cooperative learning instructional strategy is Novel

Figure 1 above showed the percentage of the student that agreed that cooperative learning instructional strategy was new to them. From the result, 79.37% and 86.67% of the student in 2015/16 and 2016/17 session respectively agreed that cooperative learning instructional strategy was new to them.

Research Question two: What is the difference between the attitudes of students in both sessions toward cooperative learning instructional strategy? The mean and mean difference was computed and the result presented in table1below

Table 1: Mean and Standard Deviation of the Attitude Score of Students in two Session

GROUP	N	Mean	Mean Diff	Std. Deviation	Std. Error
Years2015	81	3.079	0.003	.3685	.0409
Year2016	30	3.082		.3397	.0620

(P > 0.05),

The table above showed attitude mean score of 3.079 for students in 2015/2016 session and 3.082 for students in 2016/2017. The result also revealed a low mean difference of 0.003.

Hypothesis: There is no significant difference between the attitudes of undergraduate science education student in the two sessions. This hypothesis was tested using the Mann- Whitney U statistics. The result is presented on table 2 Table 2: Mann- Whitney U statistics of Attitude Score

GROUP	N	Mean Rank	Sum of Ranks	Mann-Whitney U	Wilcoxon W	Z-cal.	p-value
Year2015	81	56.53	4579.00	1172.000	1637.000	-.286	0.775
Year2016	30	54.57	1637.00				
Total	111						

(P > 0.05),

The table above showed a p- value of 0.775 which is greater than the set level of significance, 0.05. This result indicates no significant difference in the attitudinal measurement between the sessions. Therefore the null hypothesis which stated that, there is no significant difference in the attitude of students in both sessions is hereby retained.

From the result in figure 1, high percentage of the students in both sessions see cooperative learning instructional strategy as a novel strategy. This could be attributed to the fact that many research findings about innovative instructional strategy like cooperative learning are not being put into practice. The result agree with Oyelekan, Igbokwe, Olorundare (2017) who reported 89.5% and 76.2% of not use for Jigsaw and think pair share cooperative learning strategies.

Discussion

The result in figure 1, showed that high percentage of the students see cooperative learning as something new. From the result it sounds reasonable to posit that the wealth of research on cooperative learning has not been translated into classroom practice. According to Moukaddem & Hernandez (2011), Students' brains like novelty which is an innate attention getter**.** In other word,the brain has a way of connecting to something new and this can arouse the student attitude. The result is in congruent with Oyelekan, Igbokwe, Olorundare (2017) who reported 89.5% and 76.2% of not use for Jigsaw and think pair share cooperative learning strategies.

The result in table 1 and 2 showed that the attitude of the students was positive. It also revealed no significant difference in the attitude of students toward cooperative learning in both sessions. This might be due to the fact that, cooperative learning instructional strategy is a child centered, activity oriented instructional strategy that permit student to interact with one another in a group. The failure of one is seen as the failure of the entire group. This result is in congruent with Abubakar (2018) who reported positive attitude of biology students of different cognitive style toward cooperative learning instructional strategy. According to Abubakar (2018),that active participation of the students in cooperative learning groups chases away boredom. Lord (2001) reported that students taught under Cooperative Learning seem to be happier and satisfied.

Conclusion

Based on the result and the findings from this study, the following conclusions can be made;

(i) Undergraduate science education students have positive attitude toward cooperative learning instructional strategy.
(ii) There is no significant variation between students of both academic sessions.

Recommendations

(i) It here recommended that lecturers should utilize cooperative learning in teaching undergraduate courses.

(ii) Faculty should put up workshops and seminars to train lecturers on the use of different model of cooperative learning

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INFLUENCE OF LARGE CLASS SIZE ON STUDENTS ACADEMIC ACHIEVEMENT AND ATTITUDE TOWARDS THE LEARNING OF GEOGRAPHY IN NIGER STATE COLLEGE OF EDUCATION MINNA

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Abstract
The study examined the Influence of Large Class Size on Students Academic Achievement and Attitude towards the Learning of Geography in Niger State College of Education Minna. The study used quasi experimental and survey design. A sample of 200 NCE II students were used. Simple random sampling technique (hat and draw method) was used. Two research questions and one hypothesis guided the study. Also two research instruments were use for this study. These are Geography Achievement Test (GAT) and Geography Attitude Questionnaire (GAQ). GAQ has a reliability coefficients of 0.75 while GAT has a reliability coefficient of 0.81. Mean, standard deviation were used to answer the research questions while Independent t-test was used to test the hypothesis. The study revealed that, students' performance was better in small class size than in large class size. Similarly students also agreed that large class size affect negatively in learning of geography. In the light of this, it was recommended among others that More instructional materials should be provided to include public address system so that the students in a large class could be instructed as appropriate.

Introduction
Geography as a school subject is very important and useful to students and everyone who seeks to cope with the ever-emerging realities of our time. This is because the earth which is the focus of geography study is the theater where virtually all human activities are carried out, and it' is only reasonable that man knows about the nature and character of the earth, and consequences of interactions between man and his environment. Abdul (2017) defined Geography as a science of spatial relationships which focuses attention mainly on the interaction between man and his environments. Aman (2011) also views Geography as an inter-disciplinary field of study that influences agriculture, industry, commerce, economics development. Geography potentially assists cross- disciplinary learning and helps student to recognize the connections between geography and other field of study or specialization. Therefore knowledge of Geography is essential for successful living because of its practicable intellectual value (Abidoye & Ogunniyi, 2012).

However, reports on students' academic achievement in College of Education Minna in Geography have not been encouraging Chief Examiner's reports have highlighted persistent poor achievement of geography students (2015, 2016 & 2017). This poor achievement is attributed to large class size in geography (Sharma 2013), wide coverage of the subject (Ofodu, 2010), insufficient facility (Abidoye & Oguniyi, 2012**)** and inadequate teachers (Balogun, 2006). Therefore, as school population increases class sizes also increase, the performances of students become an issue. There is a close association between student's attitude and their achievement. Once the attitudes of students are known, suitable instructional methods can be devised to meet the interest of the student. Attitude according to Bannit (2016) is a mental set or disposition, readiness to respond on the basis of their achievement, their learned nature and characteristics.

The National Policy on Education (2004 revised in 2013) specified 20 in pre-primary, 30 in primary, 40 in secondary schools and maximum of 50 in tertiary institution especially geography department. These directives appear unrealistic in urban areas as a result of high population. From studies conducted, the size of large classes range from 30-336 and small from 8-45 (Guney, 2014). The bench mark of student in geography department in past 10 years is 50 per class but now the bench mark as of date has shift from 50 to 200 per class, the increase in the number of student's in the class influence academic achievement of student field work (2017). Therefore, large class size of students in tertiary institutions influences the academic achievement of students which in turn affect the development of any nation Cohen and Monnow (2010).

Statement of the Problem

The large class size of students into Geography Department College of Education Minna, for the past ten (10) years has become a matter of concern. The influence of class size on academic achievement has been the focus of both academic and policy debate for some time now. Most previous studies had tend to attribute this problem to factors that are extraneous to the learner, such as poor physical facilities, school environment etc. Various strategies adopted by different governments and agencies tend not to address the problem substantially. There is therefore further need to research into other possible factors or variables underlying students' achievement in geography, since behaviour is a product of environmental and psychosocial variables. It is against this background that the researcher intends to carry out this research work in order to find out the influence of large class size on students academic achievement and attitude towards learning of geography in Niger State College of Education Minna.

Objectives of the Study

The study aimed to achieve the following objectives

(i) To determine the academic achievement of student in large class and student taught in small class size in the department of geography

(ii) To determine student attitude towards learning in relation to large class size in the department of geography.

Research Questions

The following research questions were raised to guide the study.

(i) What is the mean achievement scores of geography student's taught in a large class size and those students taught in a small class size?

(ii) What is the attitude of student's towards the learning of geography in large class size?

Research Hypotheses

The null hypothesis formulated to guide the study and will be tested at 0.05 alpha level is

HO_1: There is no significant difference in the mean scores of student's taught in large class size and those students taught in a small class size.

Methodology

The research adopted both survey and quasi experimental design. The quasi experimental design entails pretest, posttest, non equivalent experimental and control group design. The population of the study was 1,200 students across the three levels that is NCE I NCE II and NCE III. The sample size for the study is 200. This comprises of 200 students for the achievement test and 100 students randomly selected from the same group for the questionnaire. Simple random sampling techniques using hat and draw method was used for the study in selecting the students. Two research instruments were use for this study. These

are Geography Achievement Test (GAT) Geography Attitude Questionnaire (GAQ). The reliability coefficients of 0.75 was obtained for GAQ while GAT has a reliability coefficient of 0.81.

Results

Research Question One: What is the mean achievement scores of geography student's taught in large class size and those students taught in a small class size?

Table 1: Mean, Standard Deviation of Students' in small and large class size in Geography

Variable	N	Mean ($\bar{X}$)	S.D
Small class size	50	28.10	1.84
Large class size	150	13.13	3.65

Table 4.1 above shows the mean and standard deviation of students in large and small class size. A mean value of 28.10 was obtained for students in small class size and a mean value of 13.13 was obtained for students in large class size. The results indicate that students in small class size perform better than students in large class size.

Research Question Two: What is the attitude of student's taught geography in large class size and those taught in small class size?

Table 2: Attitude of students toward the learning of Geography in large class size

S/N	ITEM	Mean ($\bar{X}$)	S.D	Decision
1	Large class size reduces noise making in the class	1.76	1.07	Disagree
2	large class size allow students to engage in examinations malpractice	2.97	1.44	Agree
3	Large class size enables the students to be punctual in the class	1.40	.87	Disagree
4	Large class size does not enable me to learn very well	3.45	1.21	Agree
5	The number of day spent in class during field work is enough for practical aspect of geography	1.28	.45	Disagree
6	Is enough preparation and logistics (vehicles) ok for you during field work in Geography	1.48	.66	Disagree
7	Will large class size enable me to hear and listen well	1.45	.76	Disagree
8	Will large class size enables lecturer to deliver his/her lecture regularly	1.41	.71	Disagree
9	Large class size enable me to sit comfortably in the lecture hall	1.34	.64	Disagree
10	Large class size in geography does not enable me to have adequate student-teacher interaction in the class	3.16	1.36	Agree
11	Large class size creates conducive learning environment for both teachers and learners in geography department	1.12	.41	Disagree
	Grand Mean ($\bar{X}$)	1.89		Disagree

Decision Mean ($\bar{X}$) = 2.5

From table 4.4, it could be noted that students agree to item 2, 4 and 10. These items revealed that large class size encourage students to engage in examination malpractice, large class size does not allow students to learn very well and large class size does not allow for adequate teacher to student interaction.

Hypothesis One: There is no significant difference in the mean scores of student's taught in large class size and those students taught in a small class size.

Table 3: Summary of independent t-test Analysis of students' mean score achievement in small and large class size

Variable	N	Mean ($\bar{X}$)	S.D	df	t-value	p-value	Decision
Small class size	50	28.10	1.84				
				198	27.79*	.000	Significant
Large class size	150	13.13	3.65				

* Significant at P = 0.000

The result from table 4.6 shows t-value = 27.79, df = 198, p = 0.000. Thus, the hypothesis was rejected. This means that, there exists significant difference between the mean score of students in small class size and large class size.

Discussion

Results from this study indicate that, there was significant difference between the performance of students in small and large class size. Students perform better in small class size than in large class size. This finding is in agreement with Abidoyi (2015) who examined the effect of large class size on secondary school student's academic achievement in Geography in Oyo State Nigeria. Also the finding is in agreement with Omwirhiren and Faith (2016) who examine the effect of class size and student attitude on academic performance in geography among Demonstration Secondary School Students of Ahmadu Bello University, Zaria and reported students performance was better in small class size than large class size.

Furthermore, it was revealed from this study that students view large class size to have negative impact on students' academic achievement. They agreed among others that, Large class size in geography does not enable them to have adequate student-teacher interaction in the class and that large class size allow students to engage in examinations malpractice. This finding is supported by Sun, (2015) who opined that large class size issues in school and its influence on students achievement is heart breaking, some of the issues associated with large class size according to Sun (2015) are noise making, examination malpractice and fighting.

Conclusion

The findings suggest that large class size influence the academic achievement of the students which result into the formation of negative attitude on both the students and the lecturers. Similarly, there was a significant difference in academic achievement in Geography between the large class size and the small class size. That is small class size student tend to achieve better than the large class size. The findings from the study concluded that these results apply to only College of Education Minna. The result certainly suggest avenues for further research and it would be desirable to examine these relationships using data from more than one institution.

However, it was found that Attitude, Class size are significant factors influencing academic achievement in geography.

Recommendations

The following recommendations were proffered:

(i) More instructional materials should be provided to include public address system so that the students in large class could be instructed as appropriate.

(ii) Geography teachers should direct more attention particularly to female students to make them improve on their academic achievement.

(iii) Parents as well as Geography teachers should encourage students to develop positive attitude towards Geography. Also, parents should provide equal learning opportunities to their children and should not discourage the girls from studying Geography.

(iv) The ministry of Education, curriculum developer in conjunction with Geography authors as well as Geography teachers should design Geography textbooks devoid of any gender bias.

(v) The study on student's attitude, class size and gender should be applied to other disciplines in science so as to compare findings and make recommendations.

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FACTORS PREDICTING THE ACCEPTANCE TO USE NEW MEDIA AMONG COLLEGES OF EDUCATION LECTURERS IN NORTH CENTRAL NIGERIA

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Abstract
This study examined factors predicting the acceptance to use new media among colleges of education lecturers in North Central Nigeria. Three research questions and three corresponding null hypotheses guided the study. Descriptive Survey research design was adopted for the study. A Sample of 410 lecturers from colleges of education in North Central Nigeria were randomly selected, using multi-stage sampling technique. The instrument used for gathering data was questionnaire titled Lecturers' Acceptance to Use New Media Questionnaire (LAUNMQ). The instrument was validated by three educational technology experts. Cronbach Alpha formula was used to determine the reliability coefficient of the instrument, and 0.76, 0.84 and 0.79 values were obtained for each of the research question respectively. Mean and standard deviation was used to answer the research questions while regression analysis was used to test the research hypotheses. The findings revealed that hypothesis one was rejected ($p < .05$) since there was significant difference in the performance expectancy of lecturers in new media usage. Hypothesis two was also rejected ($p< .05$) as there was significant difference in the effort expectancy of lecturers in new media usage. Hypothesis three was rejected ($p < .05$) due to the fact that there was significant difference in the self-efficacy of lecturers in new media usage. Based on the findings it was recommended among others that stakeholders of colleges of education should always provide the necessary new media devices that can enhance instructional delivery in the colleges of education. Authorities of Colleges of Education should organize workshop on new media utilization strategies with a view to bringing about efficiency and effectiveness in new media for instructional delivery.

Keywords: *Performance- Expectancy, Effort-expectancy, Self-efficacy, New media, Acceptance*

Introduction
The world turned global as a result of the ingenious stride that has been made by man in media technology and utilization platform to the extent that substantial percentage of the world population today is connected to one form of media technology or the other ultimately bringing human interaction much closer than ever. Sadiq (2012) observed that the concept of "Global Village" came to being due to the emergence of contemporary media technological innovation for the purposes of information dissemination, sharing and reception that is referred to as New Media. The new media concept is significantly different from traditional media, this is because new media referred to in this study comprise all communication gadgets and platforms that are internet based with On-line accessibility, digital in nature, high speed in operation, easy to manipulate and fascinating to user. New media is an emerging platform that has reduced greatly, the cost and troubles of travelling. New media has brought drastic revolution positively in gathering, sending and reception of information. Every aspect of human endeavour is now influenced one way or the other by new media technological advancement to the extent that one core aspects of transformation of an individual in the society that is, the education sector is becoming highly digitalized both in process and in product. However, the digitalization of

education in Nigeria is having a strong basis in the document guiding the conduct of educational system.

The National Policy on Education(FRN, 2013) posited that education is the instrument of change per excellence, and the Federal Republic of Nigeria (FRN, 2013). In a related provision, the document guiding the conducts and operations of Colleges of Education in Nigeria that is The Minimum Standards for General Education by the National Commission for Colleges of Education (NCCE, 2012) categorically states that: "The Centre for Educational Technology should be a service unit in the school of education to acquire, produce and house instructional resources to facilitate effective teaching and learning"

Inferring from NPE, education therefore can be used for behaviour modification, intellectual development and skill acquisition as such should be conducted in line with the modern trend, while the Minimum Standards of NCCE simplified the ways and manners of conducting general education by laying emphasis on and enumerating the software and hardware facilities to be provided in line with new media for instructional delivery. So advancement in media technology in the form of new media during the latter part of 20th century is a desirable development to the education sector with expansive information and data sharing (Brenner, 2012). It has widened the boundaries of learning beyond the four walls of the classroom creating waves in education sector with its exclusive characteristics such as instant messaging, learning at ones' own pace in the form of individualized learning, information sharing among other characteristics (Bakia, 2011). So the infiltration of new media in Nigeria's education sector is highly justified in the National Policy on Education.

It has also been discovered that new media is a significant innovation that has evolved and taking over from traditional media very quickly through its interactive characteristics (Adewale, 2009). It has substantially transformed the entire world of media. It has digitized the world and made it accessible with ease. New media has broken the barriers of traditional media which was confined to just providing content without allowing the readers or viewers active participation. It has revamped the educational world through content sharing and constant updating and upgrading of the information creating sweeping changes in the learning process. The new media has provided in public domain interaction with varied forms of information and knowledge sharing. Today, the world is witnessing drastic shift in learning from the confine of classrooms and library to the world of technological innovations through new media. For example, Social networking sites, blogs, wikis, smart phones, electronic smart board, i-pad, internet platform to mention a few enable browsing and surfing, cable television are now supplementing the classroom teaching. They have become the learning tools of contemporary academics.

From the foregoing therefore, the researchers have enthusiastically taken up the challenge to embark on this study to focus on the lecturers' acceptance to use new media for instructional delivery in Colleges of Education in North Central Nigeria. Presently, new media has made debute in Nigeria education sector enhancing competitiveness by responding to the globalization status of the world allowing researchers to explore their interests and curiosity on the global scale (Lee, 2006). It has interwoven into the fabric of academic life with instructors becoming constructive and resourceful in their own field through online services. The digitalization and online facilities have evolved a new learning style called outreach learning which equipt students with industrial content and skills that is more appropriate for employability. Moreso, new media broadens the knowledge sphere of students by facilitating interactions, community learning and exchange of ideas. Outreach learning beyond the

classroom provides students an experiential learning of theoretical aspects helping in better understanding. New media through its advancement in education sector has provided a multidimensional learning approach there by enhancing outreach learning giving rise to generation of innovative and competitive students. Noteworthy is the fact that availability of new media is not an end in itself; utilization is very key and paramount. It is from this stand point that the researcher got agitated to embark on this study investigating the possible factors that could be responsible for or predicting the acceptance to use new media for instructional delivery in Colleges of Education sector of the tertiary institutions in Nigeria. The researchers are therefore well guided by the following paradigms namely: performance expectancy, effort expectancy and self-efficacy.

Haeng-Nam, Dae-Yul, Yeon-Su and Jae-Ik (2015) carried out investigation on relationship among self-efficacy, social influence, performance expectancy, effort expectancy, and behavioral intention in mobile learning service. It was revealed in their study that effort expectancy has positive effects on performance expectancy and behavioral intention to use mobile learning.

Daniel (2015) in a study revealed that performance expectancy, effort expectancy, social influence and facilitating conditions are significant antecedents of behavioural intention towards e-book use. Omar and Mutaz (2014) examined factors affecting college students' behavioral intentions to use m-learning in Saudi Arabia. Results of this research show that performance expectancy is the main factor affecting students' adoption intention to use m-learning in the future. This is followed by effort expectancy and Social Influences factors respectively.
Isaac (2016) who carried out investigations on Perceived ease of use (PEOU) and perceived usefulness (PU) of e-government services in Ghana. The results indicate that computer self-efficacy does not significantly moderate the relationship between perceived ease of use and perceived usefulness of e-government services. Iliyas, Adio, Omopupa and Abdulmumeen (2007) who carried out a research titled English language is gradually becoming the world's lingua franca, and the social media has broken all barriers to human connections and divides. The study found that students generally deplore self-efficacy in their communication in English language on social media.

A good number of the lecturers in colleges of education in Nigeria are familiar with modern day New Media devices though for outside the classroom usage. Devices such as mobile phone, I-pad, computers as well as application software and on-line social media platforms such as Twitter, WhatsApp, Blog, Face Book, YouTube, instagram and others can be used to package information for students by lecturers in the form of courseware or instructional delivery package in the form of Management and Information System (MIS). Invariably, the difference between availability and utilization of new media for instructional delivery constitute the gap this study is designed to address. This is because apathy and phobia to use new media platform and technology seem traceable to the poor utilization phenomenon, Chidi and Olumati (2014), in their findings observed that trainee teachers appreciated the benefits of new media in teaching and learning, although majority of them did not use new media during their teaching practice exercise because they exhibit phobia towards new media during training. Poor electricity supply and non-functional media facilities in their practicing schools were visible. The concern of this study therefore would be to look at variables such as performance expectancy, effort expectancy and self-efficacy predicting the acceptance to use new media technology among colleges of education lecturers in North Central Nigeria. Model such as Technology Acceptance Model (TAM) by Davis (2003) among others was employed to correlate the variables such as performance expectancy, effort-expectancy and self-efficacy.

The aim of this study was to determine factors predicting the acceptance to use new media among colleges of education lecturers in North Central Nigeria Specifically the study strived to determine:

(i) the performance-expectancy on the use of new media for instruction among lecturers in college of education in North Central Nigeria.
(ii) the effort-expectancy on the use of new media for instruction among lecturers of colleges of education in North Central Nigeria.
(iii) the self-efficacy of college of education lecturers on the use of new media for instruction in North Central Nigeria.

Research Questions

(i) What is the performance expectancy of College of Education lecturers on acceptance to use new media for teaching in North Central Nigeria?
(ii) How do College of Education lecturers perceive their effort expectancy of new media for teaching in North Central Nigeria?
(iii) To what extent are College of Education lecturers perceive their self- efficacy of new media for teaching in North Central Nigeria?

Research Hypotheses

HO_1: There is no significant relationship between performance- expectancy and acceptance to use new media among lecturers of Colleges of Education in North Central Nigeria
HO_2: There is no significant relationship between effort-expectancy and acceptance to use new media among lecturers of Colleges of Education in North Central Nigeria.
HO_3: There is no significant relationship between self-efficacy and acceptance to use new media among lecturers of Colleges of Education in North Central Nigeria.

Methodology

Descriptive survey research design was employed to elicit information on lecturers on factors predicting the acceptance to use new media among Colleges of Education lecturers in North Central Nigeria. The population for this study comprised all lecturers of Colleges of Education in North Central Nigeria. A total number of 410 lecturers were selected from four colleges of education using multi-stage sampling technique. Questionnaire on Lecturers Acceptance to Use New Media (QLAUNM) was used for data collection. The instrument contains two sections. Section A collected the demographic data of the respondent. Section B contains the items on performance expectancy, effort expectancy and self-efficacy. The instrument was validated by three educational technologist experts. To determine the reliability of the instrument, 100 copies of the questionnaire were administered on pilot sample, Cronbach Alpha was used to obtained reliability co-efficient of 0.76, 0.84 and 0.79 values were obtained for each of the research question respectively. on lecturers' respondent. The instrument was administered to 410 lecturers. All 410 copies were duly completed, collected and analyzed. The data were weighted using 5 - point Likert scales in which strongly agree (SA) rated 5 points, Agree (A) rated 4 points, Undecided (U) rated 3 points, Disagree (D) rated 2 points and Strongly Disagree (SD) awarded 1 point. A mean of 3.0 was used as acceptable mean agreement while the mean below 3.0 signified disagreement. The research questions were analyzed by computing the responses of the respondents using Mean and Standard Deviation while regression analysis was used to analyzed hypotheses three hypotheses at alpha level of 0.05.

Results

Research Questions One: What is the performance expectancy of college of education lecturers on acceptance to use new media for instruction in North Central Nigeria?

Table 1: Mean and Standard Deviation of performance expectancy responses of lecturers on use of new media for instruction.

S/N	Item	$\bar{X}$	SD	Decision
PE1	Using new media in doing my job would enable me to accomplish academic tasks more quickly.	4.28	2.65	Agree
PE2	My whole body becomes ready when am to use new media	4.17	0.79	Agree
PE3	Using new media would improve my job performance greatly.	3.94	0.97	Agree
PE4	Using new media help me to teach difficult concepts	3.93	2.68	Agree
PE5	I would find new media useful in my job	3.92	0.87	Agree
PE6	Other lecturers commend me for using new media for instructional delivery	3.84	2.17	Agree
PE7	My co-lecturers like to work with me when using (new media)	3.83	2.19	Agree
PE8	I get motivated when I think about using new media in teaching	3.81	0.94	Agree
PE9	Using new media would enhance my effectiveness in the job	3.72	1.06	Agree
PE10	Using new media in my work would enhance my productivity positively.	3.68	1.84	Agree
	Grand Mean	**3.91**		

Decision Mean =3.00

Table 1 shows the mean and standard deviation of performance expectancy responses of lecturers' on use of new media for instruction. The respondents are in agreement with the items stated in the research instrument on performance expectancy. Also the items mean rating which ranged between 3.68 and 4.28 are all considered accepted based on the decision mean of 3.0. The implication is that, the performance expectancy of lecturers on acceptance to use new media is favourable since all the items on performance expectancy show agreed based on decision mean.

Research Question Two: Do college of education lecturers perceived their effort expectancy on acceptance of new media for instruction in North Central Nigeria?

Table 2: Mean and Standard Deviation of effort expectancy responses of lecturers on use of new media for instruction

S/N	Items	$\bar{X}$	SD	Decision
EE1	It will be easy for me to become skilled in instructional delivery when using new media.	4.33	2.18	Agree
EE2	I do well in using new media to pass instruction	4.22	2.57	Agree
EE3	I would find new nedia flexible to intract with.	4.05	3.46	Agree
EE4	My new media operation skill makes it easy for me	4.00	0.88	Agree

	to deliver lectures.			
EE5	I find the new media easy to use for instructional delivery.	3.98	2.20	Agree
EE6	I find it easy to use new media to do what I want to do as an academics	3.96	2.57	Agree
EE7	Seeing students doing well in my course using new media encourages me to do better.	3.87	2.24	Agree
EE8	Evaluating students performance online using new media is more convenient for me	3.83	1.05	Agree
EE9	I can use new media to enable students to developed problem solving skills.	3.81	0.90	Agree
EE10	My interaction with students using new media would make my lesson easy for them to understand and comprehend instruction	3.67	1.00	Agree
	Grand Mean	**3.97**		

Decision Mean =3.00

Table 2 shows the mean and standard deviation of effort expectancy of lecturers on use of new media for instruction. This indicates that all the items scores more than 3.0 decision mean, which imply that all the items were accepted, an indication that the lecturers' effort expectancy enhances the acceptance to use new media for instructional delivery in colleges of education in North Central Nigeria. The implication is that, the effort expectancy of lecturers on acceptance to use new media is favourable since all the items on effort expectancy show agreed based on decision mean.

Research Question Three: To what extent does college of education lecturers perceive their self efficacy on acceptance of new media for instruction in North central Nigeria?

Table 3: Mean and Standard Deviation of self efficacy reponses of lecturers on use of new media for instruction

S/N	Items	$\bar{X}$	SD	Decision
SE1	If I practiced every day, I could develop just about any skill in my pedagogy through new media.	4.21	2.21	Agree
SE2	I can change my basic level of academic abilities considerably through the use of new media.	4.08	3.56	Agree
SE3	I am confident that I will achieve the instructional goals that I set, when I use new media for instruction.	4.03	1.28	Agree
E4	When I am confronted with academic problems, I can find several solutions through new media always.	4.01	2.11	Agree
SE5	I think that no matter the level of subject mastery I have acquired, I significantly develop instructional delivery skill with new media	3.92	2.14	Agree
SE6	Evaluating students' performance online using new media is more convenient for me.	3.91	2.65	Agree
SE7	I can use new media to enable students to developed problem solving skills.	3.88	2.21	Agree
SE8	I can solve most problems if I invest effort in employing the appropriate new media	3.83	0.95	Agree
SE9	I manage time effectively when I use new media for instruction.	3.83	0.90	Agree

SE10	I can succeed in whatever discipline of academic pursuit if am assign to deliver content to students through new media	3.68	1.00	Agree
	Grand Mean	**3.94**		

Decision Mean =3.00

Table 3 Indicate self efficacy of lecturers on use of new media for instruction. It was agreed with the mean values ranging from 3.68 to 4.21. From the analysis, it was reveals that lecturers self-efficacy promote proficiency of lecturers in the use of new media for instructional delivery in colleges of education in the North Central Nigeria. The implication is that, the self-efficacy of lecturers on acceptance to use new media is favourable since all the items on self-efficacy show agreed based on decision mean.

Hypotheses: Correlation analysis of effort expectancy, performance expectancy, self- efficacy and acceptance to use new media among lecturers in college of education in North Central Nigeria

Table 4: Regression analysis of effort expectancy, performance expectancy, self-efficacy and acceptance to use new media

		Effort-Expectancy	Performance Expectancy	Self Efficacy	Acceptance to Use
Effort-Expectancy	Pearson Correlation	1	.355**	.293**	**.376****
	Sig. (2-tailed)		.000	.000	.000
	Sum of Squares and Cross-products	25704.449	7834.037	7576.122	8029.444
	Covariance	62.847	19.201	18.524	19.632
	N	410	409	410	410
Performance-Expectancy	Pearson Correlation	.355**	1	.305**	**.355****
	Sig. (2-tailed)	.000		.000	.000
	Sum of Squares and Cross-products	7834.037	18967.267	6786.636	6509.900
	Covariance	19.201	46.488	16.634	15.956
	N	409	409	409	409
Self- Efficacy	Pearson Correlation	.293**	.305**	1	**.384****
	Sig. (2-tailed)	.000	.000		.000
	Sum of Squares and Cross-products	7576.122	6786.636	26094.305	8267.110
	Covariance	18.524	16.634	63.800	20.213
	N	410	409	410	410
Acceptance to Use	Pearson Correlation	.376**	.355**	.384**	1
	Sig. (2-tailed)	.000	.000	.000	
	Sum of Squares and Cross-products	8029.444	6509.900	8267.110	17719.320
	Covariance	19.632	15.956	20.213	43.324
	N	410	410	410	410

**. Correlation is significant at the 0.05 level (2-tailed).

The result of correlation analysis in (Table 4) was used to verify the following null hypotheses (H01, H02, & H03) respectively. The finding showed that performance expectancy, effort expectancy, and self efficacy significantly correlated with acceptance to use new media for teaching. Therefore, hypothesis one (**$HO_{1:}$**) that stated no significant relationship between performance expectancy and acceptance to use new media was not supported, because the analysis revealed that performance expectancy statistically and significantly correlated with acceptance to use new media at $r = 0.35$, $p < 0.05$. This implies that there was significant relationship between performance expectancy and acceptance to use new media.

Similarly, hypothesis two (**$HO_{2:}$**) stated that no significant relationship exist between effort expectancy and acceptance to use new media was not supported, because the analysis on the table showed $r = 0.37$, $p < 0.05$ which mean statistical relationship exist between effort expectancy and acceptance to use new media for instruction. The implication is that there was significant relationship between effort expectancy and acceptance to use new media.

Hypothesis three (**$HO_{3:}$**) stated that no significant relationship exist between self efficacy and acceptance to use new media was also not supported, because the analysis on the table showed $r = 0.38$, $p < 0.05$ which mean statistical relationship exist between self efficacy and acceptance to use new media for instruction. The implication is that there was significant relationship between self- efficacy and acceptance to use new media.

Discussion of Results

There was no significant relationship between performance- expectancy and acceptance to use new media among lecturers of colleges of education in North Central Nigeria. This is in agreement with the findings of Haeng-Nam, Dae-Yul, Yeon-Su & Jae-Ik (2015) who carried out investigation on relationship among self-efficacy, social influence, performance expectancy, effort expectancy, and behavioral intention in mobile learning service and that effort expectancy has positive effects on performance expectancy and behavioral intention to use mobile learning. It also concur with the finding of Daniel (2015) who investigated understanding behavioural intention towards e-books use: does gender really matter? And found that performance expectancy, effort expectancy, social influence and facilitating conditions are significant antecedents of behavioural intention towards e-book use.

There was no significant relationship between effort-expectancy and acceptance to use new media among lecturers of colleges of education in North Central Nigeria. This is supported by the findings of Omar, Enas, and Mutaz (2014) whose study examining factors affecting college students' behavioral intentions to use m-learning in Saudi Arabia, revealed that performance expectancy is the main factor affecting students' adoption intention to use m-Learning in the future. This is followed by effort expectancy and Social Influences factors respectively.

There was significant relationship between self-efficacy and acceptance to use new media among lecturers of Colleges of Education in North Central Nigeria. This is in line with the study of Isaac (2016) who carried out investigations on perceived ease of use and perceived usefulness of e-government services in Ghana and found that computer self-efficacy does not significantly moderate the relationship between perceived ease of use and perceived usefulness of e-government services. It is also in agreement with the findings of Iliyas, Adio, Omopupa and Abdulmumeen (2007) who carried out a research titled English language is gradually becoming the world's lingua franca, and the social media has broken all barriers to human connections and divides and found that students generally deplore self-efficacy in their communication in English language on social media. Also the finding concur with the study of Shittu, Baffa, Gopep

and Abubakar (2016) who investigated predictor of acceptance of computer mediated instruction among teacher educators in Niger State College of Education Minna and found that self-efficacy is the only factor that can induce teacher educators to accept use of computers mediated instruction for students' instruction.

Conclusion

Performance- expectancy has been found to be veritable factor that predict acceptance to use new media in colleges of education for instructional delivery. This is because performance expectancy as factor revealed perceived ease of usage of new media.

In the same vain effort expectancy from the study is found to be another factor that can predict lecturers' acceptance to use new media for instructional delivery based on the findings from this study, effort expectancy help to reveal lecturers perceived usefulness of new media.
Self efficacy was equally found to be factor that predicts usability of lecturers' acceptance to use new media for instructional delivery.

Recommendations

Stakeholders of colleges of education should as a matter of urgent importance provides necessary new media devices that can enhance the usage for for instructional delivery in the colleges of education. Stakeholder as matter of urgent should organize workshop on new media utilization for instructional delivery

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EFFECTIVE HUMAN RESOURCES MANAGEMENT AS A TOOL FOR ENHANCING QUALITY TECHNICAL TEACHER EDUCATION IN KADUNA STATE, NIGERIA

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Abstract
This study examined ways of enhancing quality technical teacher education in Kaduna State, Nigeria through effective human resources management. The study was guided by four research questions. Descriptive survey research design was adopted for the study. The population of the study comprised of 19 administrators and 84 lecturers in the 3 technical teacher training institutions in Kaduna State. Data for the study were collected using a 23 item structured questionnaire whose reliability coefficient was calculated using Cronbach Alpha and was found to be 0.88. Mean statistics and standard deviation were employed to answer the research questions. Findings of the study include among others that respondents strongly agree that recruitment should be carried out based on approved guidelines and that training and development should be carried out based on compliance with implementation of approved guidelines in technical teacher training institutions towards enhancing quality technical teacher education. It was recommended among others that proper procedures for recruitment should be adopted by employers and administrators in order to recruit the qualified personnel to work in technical teacher training institutions. Seminars, workshops and conferences should be organized by employers and administrators for staff within and outside the institutions regularly to update their knowledge.

Keywords: Human Resources Management, Quality Technical Teacher Education, Technical Teacher Training Institutions

Introduction
In the quest for self-actualization, Nigeria as a nation has been making effort to develop her industrial sector. One of the steps taken is the training of people who will are expected to train people in technical colleges. The programme in which these teachers are trained is what is referred to as the Technical Teacher Education. Technical teacher education is the type of education that prepares individuals for teaching positions in technical colleges. The type of certification given to graduate of the institutions in question is the Nigeria Certificate in Education (Technical) or NCE(T).Three of such institutions exists in Kaduna State. They are Kaduna Polytechnic, Nuhu Bamali Polytechnic, Zaria and Kaduna State College of Education, GidanWaya. The Federal Republic of Nigeria (FRN, 2013) in the National Policy on Education (NPE) places considerable emphasis on technical teacher training programme by emphasizing that the Nigeria Certificate in Education (NCE) shall be expanded to cater for the requirements of diverse categories of education including technical education. The NCE (Technical) programme therefore is geared towards empowering individuals with requisite knowledge and skills for job creation and self-employment (Gopar, 2008). But this however is far from being achieved because there are incompetent human resources to effectively provide the necessary training towards producing these teachers. Hence, the need for effective HRM in the technical teacher training institutions cannot be overemphasized.

Human Resource Management (HRM) is a very vital approach used by authorities to enhance the performance of personnel of any organisation whether public or private. It is expected that when HRM practices are taken seriously, it enables organisations to function effectively.

According to Mohammed, Bhatti, Jariko, andZehri, (2013) and Khalid, Rehmanand Ilyas(2012)HRM enables authorities to employ individuals who are highly competitive and having valuable knowledge and skills and equally retaining the skilled, competent and motivated workforce towards meeting organisational goals and objectives. Hence, it has therefore become the responsibility of every organisation's administrators, to hire, train, pay, maintain and ultimately motivate employees such as teachers towards a better service delivery. This invariably means that for effectiveness of every organisation such as the educational system to be achieved, the HRM function must be properly constituted and maintained in order to achieve the goals and objectives of the school system. Human resources according to Adeyemi (2009) entail a collection of people or individuals within an organisation having aspirations, abilities and capacities that are geared towards meeting organizational goals and objectives.

In addition, it has been noted that the management of human resources in any organisation such as the school system is an effective way of achieving organisational performance and objectives (Karsten & Ghebregiorgis, 2007). On one hand, the school system in general and Teacher Training Institutionsoffering Technical courses in particular have been discovered according to Okoye and Arimonu (2016) to be lacking behind in the country in the area of achievement of the goals of Technical Education as stated in the National Policy on Education.

This could be attributed to the inability of administrators to effectively manage their human resources thereby resulting to the decline in productivity of personnel as well as failure in the achievement of the goals and objectives of Technical Education in the country. Horgan and Muhlau (2006) and Fu (2013) stated that if effective HRM practices are implemented, it would enhance employees' knowledge, skills, abilities and motivation. It was equally argued by Mehmood, Awais Afzal Shahzadi and Khalid (2017) and Nkondola and Deuren (2017) that HRM has positive contribution to the quality of education and by implementing HRM practices, there will be increased acquisition of knowledge, skills and motivation of teachers. Therefore, for institutions offering technical teacher courses to perform better towards the achievement of goals and objectives of Technical Vocational Education and Training (TVET) as stated in the NPE, it requires that the HRM sections of Technical training institutions become proactive and ensure that the available human resources are effectively managed in the aspects of recruitment, training and development as well as welfare in order to achieve the goals of technical education in the country.

Staff recruitment in the technical teacher training institutions is the process in which individuals are screened, selected and employed to fill in the available positions. According to Gusdorf (2008) and Inyiagu (2015), staff recruitment enables institutions to attract and recruit the right caliber of both academic and non-academic staff. It is expected that guidelines that governs the recruitment of personnel in the technical teacher training institutions should be strictly adhered to in order to maintain a quality human resources workforce. To maintain a formidable human resource workforce in the technical teacher training programme, the place of training and human capital development cannot be overemphasized. According to Hervie and Winful (2018), training aims at increasing the skills, knowledge and expertise of an employee for doing a particular job. Training in the context of this study therefore is the process that provides

employees the opportunity to gain knowledge that is required to operate within the systems and standards set by any institution or educational system.

The welfare of staff is equally a very fundamental component of human resources management in the technical teacher training programme because it is a gesture that enhances motivation of employees. According to Mazaki (2017) and Nnaeto and Ndoh (2017), effective HRM serves as motivation to employees and serves as one of the most effective means of organisational growth. It therefore becomes a necessity that critical areas of the welfare of employees is catered for in order to motivate the workers. Gachie (2016) further opined that employers are saddled with the responsibility of recruitment, training and development, promotion and motivation of employees through the provision of adequate welfare services. This shows that it is the duty of employers in the institutions where technical courses are offered, to provide good conditions of service to their employees in order for themto become more committed to their duties towards promoting quality technical teacher education in Kaduna State. It is therefore important for a study that would unravel the effective human resources management capable of enhancing quality technical teacher education in Kaduna State to be undertaken.

Statement of the Problem

A very careful look at the Nigerian educational system shows that teachers, school administrators, policy makers and even governments on daily basis are in a dilemma by frustrating employer-employee related challenges. The challenges include the inability of employers to hire the right workforce, provide appropriate training for the hired workforce and to equally provide the needed welfare to employees. Nkondola and Deuren (2017) and Agi and Nnokam (2013) are of the opinion that these challenges in the Nigerian educational system in-turn put pressure on the human resource managers such as school administrators and equally result to lack of commitment on the path of teachers in the technical teacher training institutions thereby slowing down the achievement of the goals and objectives of technical education as stated in the National Policy on Education (NPE). According to Oyenenye (2006), the credibility of Nigerian educational system is at a deteriorating state both nationally and internationally whilst the products of tertiary level of education can no longer be compared with those at the same level of education in other parts of the world. This is an unpleasant situation especially when the human resource at the technical teacher training programmes are not properly recruited, trained and motivated thereby affecting the quality of services rendered by employees and on the long run affecting the quality of products that are graduated from the institutions every year. It is in order for the status quo to be changed that this study was embarked upon. Therefore, the problem of this study is effective human resources management as a tool for enhancing quality Technical Teacher Education in Kaduna State, Nigeria.

Purpose of the Study

The aim of the study was to provide insight on effective human resources management as a tool for enhancing quality technical teacher education in Kaduna State, Nigeria. Specifically, the study sought to identify:

(i) How staff recruitment complies with approved guidelines towards enhancing quality technical teacher education in Kaduna State.
(ii) How staff training and development is implemented based on approved guidelines toward senhancing quality technical teacher education in Kaduna State.
(iii) How staff welfare is implemented based on established guidelines towards enhancing quality technical teacher education in Kaduna State.

(iv) The strategies adopted for effective human resources management towards enhancing quality technical teacher education in Kaduna State.

Research Questions

The following research questions were raised to guide the study:

(i) How is staff recruitment in technical teacher training institutions complied with based on approved guidelines towards enhancing quality technical teacher education in Kaduna State?

(ii) How is staff training and development in technical teacher training institutions implemented based approved guidelines towards enhancing quality technical teacher education in Kaduna State?

(iii) How is staff welfare in technical teacher training institutions implemented based on established guidelines towards enhancing quality technical teacher education in Kaduna State?

(iv) What are the strategies to be adopted for effective human resources management towards enhancing quality technical teacher education in Kaduna State?

Methodology

Descriptive survey design was adopted for the study. Descriptive survey research according to Salaria (2011) is to carry out a study which includes proper analysis and interpretation of data on a sampled population so that the result can be generalised on the entire population. The study was carried out in Kaduna State, Nigeria. The population of the study comprised of 19 administrators and 84 lecturers in the 3 technical teacher training institutions in Kaduna State. Due to the manageable size of the population, no sampling was involved. The instrument for data collection was a four point structured questionnaire of; Strongly Agree (SA=4), Agree (A=3), Disagree (DA=2), and Strongly Disagree (SD=1), which was validated by three experts.

The instrument was then pilot tested on five administrators and 10 lecturers in Niger State. The reliability coefficient was calculated using Cronbach's Alpha and was found to be 0.88. The instrument was administered to respondents by the researcher with the help of three research assistants each from the institution the study was carried out. 100% return rate of questionnaire was achieved. Mean statistics and standard deviation were employed to analyse the data collected. Items with mean less than 2.50 were considered disagree, those with means 2.50 or higher were considered agreed. Additionally, the standard deviation of items were weighed against the normal deviate of 1.96.Where it was found equal to or less, it was interpreted to mean that that the responses of the respondents were clustered around the central means and so has reliability. However, where an item had a standard deviation that is higher than the normal deviate (1.96), it was interpreted to mean that the responses were too far dispersed from the central mean and so had low reliability.

Table1: Mean Scores of respondents on compliance with approved guidelines for staff recruitment in technical teacher training institutions towards enhancing quality technical teacher education

S/N	Item Statement	$\bar{X}$	SD	Decision
1.	Recruitment intechnical teacher training Institutions should be based on areas of needs	3.61	0.51	SA
2.	Only candidates with requisites qualifications Should be employed to fill in vacant positions	3.65	0.57	SA

3.	Appropriate candidates should be selected and and employed through transparent process	3.64	0.56	SA
4.	Job related skills and competence should be considered during recruitment exercises	3.59	0.70	SA
5.	Due process should be adhered to during recruitment exercises	3.33	0.93	SA
6.	Only candidates that are certified to be physically and mentally fit should be recruited	3.58	0.76	SA

$\bar{X}$ = Average Mean, SD = Average Standard Deviation

Table2: Mean scores of respondents on implementation of approved guidelines for staff training and development in technical teacher training institutions towards enhancing quality technical teacher education

S/N	Item Statement	$\bar{X}$	SD	Decision
1.	Staff should be given the opportunity to attend workshops/seminars and conferences within and outside their institutions	3.61	0.51	SA
2.	Orientation programmes should organised for new staff to enable them become familiar with the new job	3.63	0.56	SA
3.	Staff should be encouraged to embark self-development through study leave	3.59	0.70	SA
4.	Staff seminars should be organised to create room for staff to brainstorm for better workplace	3.50	0.59	SA
5.	Staff on training should be given allowances due for the training	3.23	1.03	A
6.	Staff should be selected based on area of specialization or professional development for training	3.37	0.81	A

$\bar{X}$ = Average Mean, SD = Average Standard Deviation

Table: Mean scores of respondents on implementation of established guidelines for staff welfare in technical teacher training institutions towards enhancing quality technical teacher education

S/N	Item Statement	$\bar{X}$	SD	Decision
1.	Payment of staff entitlements regularly and at when due	3.56	0.53	SA
2.	Provision of medical services to staff and their family members	3.48	0.59	A
3.	Provision of salary advance to staff in time of financial need	3.52	0.53	SA
4.	Provision of basic amenities such as shelter, water, electricity, roads and recreational environment	3.36	0.66	A
5.	Compensating staff whenever they work overtime	3.50	0.56	SA
6.	Provision of conducive work environment and furnishings for staff	3.54	0.67	SA

$\bar{X}$ = Average Mean, SD = Average Standard Deviation

Table: Mean scores of respondents on strategies to be adopted for effective human resources management in technical teacher training institutions towards enhancing quality technical teacher education

S/N	Item Statement	$\bar{X}$	SD	Decision
1.	Due process and established guideline should be followed during recruitment of staff	3.50	0.49	SA
2.	Heads of Departments and Heads of Sections should be exposed to relevant training and development	3.71	0.46	SA
3.	Staff appraisals and promotions should follow established rules and guidelines	3.66	0.47	SA
4.	Welfare of staff should be accorded utmost priority in the institutions	3.57	0.52	SA
5.	Effective supervision and monitoring should be carried towards guaranteeing effectiveness in task performance	3.56	0.50	SA

$\bar{X}$ = Average Mean, SD = Average Standard Deviation

Discussion

The findings emerging from the opinions of the respondents with regards to compliance with approved guidelines for staff recruitment in technical teacher training institutions towards enhancing quality technical teacher education (table 1) revealed that respondents strongly agreed with all the six items. This can therefore be deduced that all respondents strongly agreed that the recruitment of personnel in technical training institutions should be carried out based on approved guidelines. This is in conformity with the opinion of Gusdorf (2008) and Inyiagu (2015) who revealed that staff recruitment enables institutions to attract and recruit the right calibre of both academic and non-academic staff in order to meet the goals of the institution.

The respondents accepted items 1, 2, 3 and 4 as Strongly Agree while equally Agreed with items 5 and 6 on the need to comply with implementation of approved guidelines for staff training and development in technical teacher training institutions towards enhancing quality technical teacher education (table 2). This is in agreement with Hervie and Winful (2018) who posited that training contributes immensely in increasing the skills, knowledge and expertise of an employee on the job and provides employees the opportunity to gain knowledge that is required to operate within the systems and standards set by the institution. It therefore signifies that there is need for steps to be taken towards professional development of staff in technical teacher training institutions.

With regards to staff welfare, the findings revealed that respondents strongly agreed with items 1, 3, 5 and 6 on the need for staff welfare services to be implemented in technical teacher training institutions towards enhancing quality technical teacher education (table 3). The findings are in consonance with Mazaki (2017) and Nnaeto and Ndoh (2017) who revealed that staff welfare should be the responsibilities of employers towards improving the working conditions of employees and serves as catalyst for motivation of employees. This therefore

indicates that catering for the welfare of staff in any institution implies giving attention to critical areas of employees needs in the work place such as housing, remuneration, office accommodation and furnishing, transportation, good health care delivery and meeting any other basic needs of employees.

The findings of the study with respect to strategies to be adopted for effective human resources management towards enhancing quality technical teacher education (table 4) revealed that respondents strongly agreed with all items. This agrees with the view of Gachie (2016) who stated that, it is the duty of employers to recruit, train and develop her staff effectively, promote their staff and motivate employees towards attaining organisational goals and objectives.

Conclusion

It was concluded based on the findings that, it is the duty of employers and administrators in Technical Training Institutions to follow the approved guidelines for staff recruitment and comply with established guidelines for staff training and development. Finally, it equally behoves on employers and administrators in Technical Teacher Training Institutions to adequately implementation staff welfare packages in order to motivate the workforce towards enhancing quality technical teacher education in Kaduna State.

Recommendations

(i) Proper procedures for recruitment should be adopted by employers and administrators in order to recruit the qualified personnel to work in technical teacher training institutions.

(ii) Seminars, workshops and conferences should be organised by employers and administrators for staff within and outside the institutions regularly to update their knowledge

(iii) Proper welfare of staff especially in the areas of health care services, accommodation should be made of paramount importance by employers in order to motivate employees.

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RELATIONSHIP AMONG AVAILABILITY, ADEQUACY AND UTILIZATION OF BIOLOGY LABORATORY FACILITIES AND STUDENTS ACADEMIC ACHIEVEMENTS IN SECONDARY SCHOOLS IN YOBE STATE, NIGERIA

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Abstract
The study investigated the relationship among availability, adequacy and utilization of biology laboratory facilities and students academic achievement in secondary schools in Yobe state of Nigeria. The study adopted a Correletional survey research design and was guided by three research questions and four null hypotheses tested at 0.05 level of significance. The population of the study comprised all the 42 biology teachers and 370 biology students across all the senior secondary schools in Yobe state. Stratified random sampling technique was used to select the student sample (370). A questionnaire containing a checklist (Biology Laboratory Facility) and a Proforma were used for data collection. Data for research questions were analyzed using Mean and Standard Deviation while Pearson Product Moment Correlation Coefficient and Multiple Correlation analysis were used for the null hypotheses. The reliability coefficient of the instrument was obtained to be 0.84 using Cronbach Alpha. The findings of the study revealed that biology laboratory facilities are either not available entirely, or where they are available they are inadequate and therefore they are not utilized by the high number of students population. There was a significant relationship between biology laboratory facility availability, adequacy, and utilization, and student's academic achievement r=.614, n=42, p<0.05, r=.572, n=42, p<0.05 and r=.590, n=370, p<0.05. To this end, it was recommended that Government at state level through Ministry of Education and Science and Technical schools Board should as a matter of priority provide and equip the laboratories with relevant, enough and usable facilities to improve student's performance in biology in external examinations and beyond.

Keywords: Academic Achievement, Laboratory Facilities, Availability, Adequacy, Utilization.

Introduction

Science (Biology) is doing and involves regular hands – on practical work for learners to develop scientific literacy to face global challenges. Biology being one of the natural sciences can be studied both indoor and outdoor as most biological specimen are plants and animals which abounds in the environment. However some laboratory facilities may not be found outside the laboratories such as reagents, hence the need to have a well stocked biology laboratory with available and adequate facilities. For biology teachers to play their roles in teaching science, laboratory facilities should be available and used appropriately to improve the performance of students. Biology can be defined as the science that deals with all forms of life, including their classification, physiology, chemistry and interactions (Wikipedia, 2015).

Students poor performance in Biology especially at Senior School Certificate Examinations (SSCE) level has become a source of concern to all stakeholders in education in the country (Imogie, 2010).One of the major reasons for this anomaly is the lack of or in appropriate application of laboratory facilities in the teaching of Biology by secondary school science teachers (Orji &Ebele in Asiyai, 2012). Biology as a key science subject is offered by most senior

secondary students (Adodo & Oyeniyi, 2013). It is a core subject required for medical sciences, biotechnology, pharmacy, microbiology, agriculture, oceanography to mention but a few.

One would be tempted to assume that the high enrolment in Biology and the fact that it deals with familiar objects like living things in general and the human body in particular, would imply high performance. From observations, performance in Biology is poor when compared with other subjects, (Adodo & Sunday, 2013). A review of student's performance in Biology in the West African Senior Secondary Certificate Examination (WASSCE) from 2005 to 2013 in Nigeria revealed fluctuation and downward trend in the students' performance (Daluba, 2012). This has attracted a lot of concern among science educators. In order to achieve the objectives and the aspiration of the government, and to improve students' performance in Biology, efforts should be directed towards improving teaching and learning of the subject (Musah and Bah, 2017). .

Achimagu (2006) classified resource materials into classroom/laboratories equipment/chemicals and textual/audio visual materials. Resources or facilities according to Umeh (2006) refers to facilities that can be used to enhance or improve educational programmes and promote teaching and learning. Biology laboratory resources/facilities can be human or material. The human resources have to do with personnel such as lecturers/teachers, laboratory technologist/assistants and students. The biology laboratory material resources are those materials available to the biology teacher for teaching and learning. They include textbooks, computers, thermometers, fire extinguishers, first aid kits, oven, incubators, chalkboards, model/mock-ups, television, radio and other electronic devices (Musah and Bah, 2017).

Although some facilities may be available and adequate but may not be put to use by the teachers. Umeh (2006) is of the view that audio visual aids such as computers and projectors are not utilized in schools due to lack of knowledge on the proper use of such resources for teaching. Onyeji (2004) had earlier reported that none of these new media (electronics) is available, accessible or used in communicating Science, Technology and Mathematics (STM) in secondary schools. Physical laboratory facilities are the fundamental factors in better learning and achievements of the students (Musah and Gero 2017). All facilities should be provided to the schools for the students' better, concrete, and real experiences. Leeper, (1968), stated that the child learns through concrete rather than abstract experiences as there are learners who use different cognitive skills for learning, such as seeing, hearing feeling and touching skills.

School facilities have been observed as a potent factor to quantitative education. The availability of laboratory facilities is essential for effective teaching and learning of Biology and consequently a good performance in students. Ifeakor (2006) is of the opinion that learning can occur through one's environment – facilities that are available to facilitate students learning outcome. Students can master better the basic concepts of Biology when they learn by doing. This implies that practical should function as the primary learning experience (Musah and Gero, 2017).

Researchers such as Oladare, Abiodun, and Bajulaiye (2006); Lavrenz (2006); Akpan (2006), Inyang (2006), Adesoji (2008); and Ihuarulam (2008) stated that there are inadequate resources for teaching and learning of science subjects in public secondary schools in Nigeria. They further stated that where there are little resources at all, they are not in good condition, while the few ones that are in good condition are not enough to go round and also the few available material are dysfunctional.

Empirical studies conducted in relation to resource utilization in education have revealed that essential facilities are not always available in schools. This inadequacy of teaching resources has been of serious concern to educators (Kennedy, 2009)**.** Lyons (2012), states that learning is a complex activity that involves interplay of students" motivation, physical facilities, teaching resources, skills of teaching and curriculum demands. The process of managing and organizing resources is called resource utilization. The utilization of resources (laboratory facilities) in education brings about fruitful learning outcomes since resources stimulate students learning as well as motivating them.

Research Questions

The following research questions were posed and answered in this study;

(i) What is the extent of availability of biology laboratory facilities in secondary schools in Yobe state?
(ii) What is the extent of adequacy of biology laboratory facilities in secondary schools in Yobe state?
(iii) What is the extent of utilization of biology laboratory facilities in secondary schools in Yobe state?

Hypothesis

The null hypothesis was formulated and tested at 0.05 level of Significance to guide the study Ho_1.There is no significant relationship among the extent of availability, adequacy and utilization of biology laboratory facilities and students academic achievement.

Research Methodology

The study was conducted using a Correlation Survey research design.. A direct observation of secondary schools biology laboratory inventory and what is available in the schools science laboratory was carried out during the study using a questionnaire checklist.

The study was carried out in Yobe state. The state capital is Damaturu. Yobe state has 17 local government areas and 42 senior secondary schools. The state is divided into three educational zones namely: Gashua zone with 20 senior secondary schools, Potiskum zone with 17 senior secondary schools, and Damaturu zone has 11 senior secondary schools (Yobe State Teaching Service Board and Science and Technical Schools Board, 2017).

The target population of the study was all Senior Secondary Two (SS2) students offering biology and 42 Heads of department of biology in the public secondary schools in Yobe state. A total of 10,231students in senior secondary schools in Yobe state constituted the population of the study. Most schools in Yobe state are single sex schools. (Yobe state Teaching Service Board, Science and Technical Schools Board, 2017).

The entire population of the 42 out of 48 Heads of department of biology (4 schools had their laboratories destroyed during the insurgency, while the rest 2 schools had no laboratories at all) in the study area was used because of small size while 370 SS2 biology students drawn from the senior secondary schools across the three educational zones in Yobe state was used. Stratified random sampling technique was used to obtain the sample of SS2 students offering biology in the public secondary schools. Six schools were randomly chosen from the three educational zones in Yobe state.

The instruments that were used in the study were a questionnaire of Biology Laboratory Facilities Checklist (BLFC) extracted by the researcher from the WAEC syllabus, and a Proforma (WASSCE Result Sheet). The instrument was face and content validated. The instrument (checklist) was validated by three experts (biology lecturers).

The reliability of the instrument was determined using the Cronbach Alpha (α) with the reliability coefficient of 0.84 that was obtained. The data for the study was generated using a questionnaire (BLF) checklist.

The data generated for the study was analyzed using the Statistical Package for Social Science (SPSS) version 22. The Research Questions were answered using descriptive Statistic (Mean and Standard Deviation) while the hypothesis one, was tested at 0.05 level of significance using Multiple Correlation.

Table 1: Mean Responses and Standard Deviations (SD) of Respondents on Availability of Biology Laboratory Facilities in Yobe State Secondary Schools.

S/N	Item	Mean	SD	Remark
1	Agar	3.52	1.15	A
2	Benedict Solution	4.02	1.13	A
3	Iodine Solution	4.66	.57	A
4	Common Salt	3.66	1.00	A
5	Starch Powder	2.80	.50	NA
6	Vegetable Oil	1.80	.74	NA
7	Milk	1.04	.21	NA
8	Yeast	2.52	1.01	NA
9	Formaldehyde	2.33	1.05	NA
10	Reducing sugar	1.71	.89	NA
11	Formaldehyde	2.38	1.05	NA
12	Basins	2.42	.85	NA
13	Bunsen Burner	2.47	1.19	NA
14	Disposable Gloves	1.42	.80	NA
15	Dissecting Board	2.80	.74	NA
16	Dissecting Kits	2.28	.94	NA
17	Tripod stand	4.09	1.07	A
18	Cotton Wool	2.19	.50	NA
19	Jugs	2.80	.74	NA
20	Fire Extinguisher	2.71	.55	NA
21	Monocular/binocular Microscope	1.47	.80	NA
22	Nets(Swoop)	2.47	.96	NA
23	Petri Dishes	2.66	1.30	NA
24	PH meters	1.61	1.14	NA
25	Quadrates	2.59	.66	NA
26	Scissors	2.83	1.08	NA
27	Sharp Knives	3.80	.50	A
28	Sieves	2.85	.84	NA
29	Buckets	4.40	.70	NA
30	Spaces/Trowels	2.42	.80	NA
31	Spatulas	4.19	.99	A

32	Test tube Rack	4.42	.59	A
33	Test tube Holder	3.54	1.46	A
34	Wash Bottles	3.50	1.03	A
35	Absorbent paper	1.47	.91	NA
36	Soil test box for minerals	1.50	.63	NA
37	Computer and software	1.78	1.11	NA
38	Fridge/freezers	1.92	1.27	NA
39	Overhead projector	1.71	.59	NA

Table 1: Contd.

S/N	Item	Mean	SD	Remark
41	Medical Specimen B	1.71	.83	NA
42	Microscope slide	2.61	1.30	NA
43	Thermometer	4.23	.90	A
44	Wash bottles	3.76	1.18	A
45	Beakers	4.19	.99	A
46	Conical flask	4.19	.96	A
47	Cover slips	2.42	.96	NA
48	Dropper	2.78	1.15	NA
49	Funnels	3.53	1.26	A
50	Hand lens	3.73	1.21	A
51	Skeleton	3.52	1.12	A
52	Wall charts/posters	3.53	1.26	A
53	Shelves/benches	4.64	.61	A
54	Chairs/Stools	4.00	1.24	A
55	Black Curtains	4.14	.64	A

Key: NA =Not Available, A= Available

The result presented in Table 1 indicates that 23 items have mean scores of 3.50 and above which implies that the items are available in the school biology laboratories, while the rest 32 items have means scores below the cut-off mark of 3.50 and are therefore classified to be un available in the biology laboratories of secondary schools in Yobe state in relation to WAEC minimum benchmark

Table 2: Mean Responses and Standard Deviations (SD) of Respondents on Adequacy of Biology Laboratory Facilities in Secondary Schools in Yobe State.

S/N	Item	Benchmark Mean		SD	Remark
1	Agar	40-60	3.90	.82	AD
2	Benedict Solution	40-60	2.95	1.32	NAD
3	Iodine Solution	40-60	4.09	1.07	AD
4	Common Salt	15-20	3.95	1.14	AD
5	Starch Powder	30-35	2.78	1.22	NAD
6	Vegetable Oil	10-20	2.69	1.17	NAD
7	Milk	10-20	2.42	.59	NAD
8	Yeast	5-10	2.50	1.31	NAD
9	Formaldehyde	15-20	3.50	1.03	AD
10	Reducing sugar	40-60	2.45	.77	NAD

11	Formalin	15-20	2.21	.87	NAD
12	Basins	30-40	2.90	.95	NAD
13	Bunsen Burner	50-70	2.57	1.34	NAD
14	Disposable Gloves	80-100	1.78	1.00	NAD
15	Dissecting Board	60-80	2.38	1.03	NAD
16	Dissecting Kits	40-50	2.14	.95	NAD
17	Tripod stand	60-70	3.71	1.25	AD
18	Cotton Wool	5-10	3.54	.77	AD
19	Jugs	25-35	2.80	.74	NAD
20	Fire Extinguisher	5-10	2.71	.55	NAD
21	Monocular/binocular Microscope 4-6		1.47	.80	NAD
22	Nets(Swoop)	20-30	2.47	.96	NAD
23	Petri Dishes	60-80	2.66	1.30	NAD
24	PH meters	10-15	1.61	1.14	NAD
25	Quadrates	25-35	2.59	.66	NAD
26	Scisors	10-15	2.88	1.08	NAD
27	Sharp Knives	20-25	3.80	.50	AD
28	Sieves	25-30	2.85	.84	NAD
30	Spaces/Trowels	10-20	2.42	.80	NAD
31	Spatulas	60-80	4.19	.99	AD
32	Test tube Rack	60-80	4.42	.59	AD
33	Test tube Holder	60-80	3.55	1.46	AD
34	Wash Bottles	50-70	3.50	1.03	AD
35	Absorbent paper	20-25	1.47	.91	NAD
36	Soil test box minerals	4-7	1.50	.63	NAD
37	Computer & software	10-15	1.78	1.11	NAD
38	Fridge/freezers	5-8	1.92	1.27	NAD
39	Overhead projector	5-6	1.71	.59	NAD
40	Graduated Cylinder	30-40	4.00	1.16	AD
41	Medical Spec. Bottles	15-20	1.71	.83	NAD
42	Microscope Slides	70-90	2.61	1.30	NAD
43	Thermometer	40-60	4.23	.90	AD
44	Wash bottles	40-60	3.76	1.18	AD
45	Beakers	40-60	4.19	.99	AD
46	Conical flask	40-60	4.19	.96	AD
47	Cover slips	70-90	2.42	.96	NAD
48	Dropper	60-80	2.78	1.15	NAD
49	Funnels	20-30	3.53	1.26	AD
50	Hand lens	70-80	3.73	1.21	AD
51	Skeleton	2-5	3.52	1.12	AD
52	Wall charts/posters	20-40	3.53	1.26	AD
53	Shelves/benches	4-8	4.64	.61	AD
54	Chairs/Stools	60-80	4.00	1.24	AD
55	Black Curtains	6-10	4.14	.64	AD

Key: A= Adequate, NAD= Not Adequate

The result presented in Table 2 shows that 24 items have mean score of 3.50 and above which implies that the facilities are adequate in Yobe state secondary school biology laboratories, while 31 items has mean score below 3.50 which is the cut-off mark indicating that the items are not adequate in the secondary schools of Yobe state in relation to WAEC minimum stipulations.

Table 3: Mean Responses and Standard Deviations (SD) of Respondents on the Utilization of Biology Laboratory Facilities in Yobe State Secondary Schools.

S/N	Item	Mean	SD	Remark
1	Agar	2.54	.88	NU
2	Benedict's reagent	3.54	.91	U
3	Iodine solution	3.53	1.09	U
4	Common salt	2.54	1.03	NU
5	Starch powder	2.34	.88	NU
6	Vegetable oil	1.29	.45	NU
7	Milk	1.45	.55	NU
8	Yeast	1.56	.59	NU
9	Formaldehyde	3.52	1.08	U
10	Reducing sugar	2.91	1.11	NU
11	Formalin	3.50	1.10	U
12	Basins	3.52	1.01	U
13	Bunsen burner	4.02	.94	U
14	Disposable gloves	2.83	.97	NU
15	Dissecting boards	2.20	1.10	NU
16	Dissecting kits	2.66	1.00	NU
17	Tripod stand	3.58	1.17	U
18	Cotton wool	3.56	1.02	U
19	Jugs	3.74	1.14	U
20	Fire Extinguisher	2.71	.55	NU
21	Monocular/binocular M	1.47	.80	NU
23	Petri dish	3.52	1.35	U
24	Ph meter	2.63	1.12	NU
25	Quadrants	2.67	1.16	NU
26	Scissors	3.51	1.08	U
28	Sieves	3.62	1.17	U
29	Buckets	3.94	1.06	U
31	Spatulas	4.02	.94	U
32	Test tube rack	4.13	.70	U
33	Test tube holders	3.91	.90	U
34	Wash bottles	4.15	.83	U
35	Absorbent papers	2.48	.64	NU
36	Soil test box for minerals	1.54	.49	NU
37	Computer and softwares	1.94	1.09	NU

38	Overhead projector	2.12	1.11	NU
39	Fridge/freezers	3.55	.95	U
40	Graduated cylinders	4.01	1.02	U
41	Medical specimen bottle	2.05	1.06	NU
42	Microscope slide	2.64	1.30	NU
43	Thermometer	3.57	1.08	U
44	Water bottles	3.65	1.05	U
45	Beakers	4.13	1.09	U
46	Conical flask	3.70	1.20	U
47	Cover slips	2.84	1.20	NU
48	Dropper	2.78	1.19	NU
49	Funnels	4.06	.89	U
50	Hand lens	3.66	1.09	U
52	Wall charts/posters	3.66	1.10	U
53	Shelves/benches	3.91	.88	U
54	Chairs/stools	3.83	1.07	U
55	Black curtains	3.66	1.16	U

KEY: U= Utilized, NU= Not utilized

The result presented in Table 3 shows that 31 items have mean rating of 3.50 and above which is above the cut-off mark implies that the items are utilized in the secondary schools in Yobe state, while 24 items whose means are below the cut-off point of 3.50 are therefore described to be unutilized in the schools biology laboratory in Yobe state in relation to WAEC minimum requirement.

Table 4: Multiple Correlation's Analysis of Availability, Adequacy and Utilization of Laboratory Facilities and Student Achievement (p<0.05)

		Academic Achievement	Availability	Adequacy	Utilization
Correlation	Achievement	1.00	.614	.572	.590
	Availability	.614	1.00	.572	.590
	Adequacy	.572	.614	1.00	.590
Utilization		.590	.614	.572	1.00
Sig (1.tailed)	Achievement		.000	.000	.000
	Availability				
	Adequacy	.000		.000	
	Utilization	.000	.000		.000
N	Achievement				
	Availability	42	370	42	42
	Adequacy	42	42	370	42
	Utilization	370	42	42	370

Correlation is Significant at 0.05 level (1-tailed)

Result presented in Table 4 shows the relationship among availability, adequacy and utilization of biology laboratory facilities and students' academic achievement which was investigated using Multiple correlation, there was a positive correlation among the three variables,, r=.614, n=42, p<0.05, r=.572, n=42, p<0.05 and r=.590, n=370, p<0.05.

The null hypothesis was rejected that there is a significant relationship among laboratory facilities availability, adequacy and utilization and students achievement.

Results and Discussion

The findings of the study related to research question one in table 1 revealed that biology laboratory facilities in Yobe state secondary schools are not available enough to be used by the students. Of the fifty five (55) items on the checklist as stipulated by WAEC, only twenty three (23) of these items are said to be available while the rest items including microscopes, overhead projectors and slides among others are not available. This anomaly greatly affects the comprehension and subsequently the performance of the students.

Findings related to research question two in table 2 revealed that the facilities in the biology laboratories in Yobe state secondary schools are grossly inadequate, this is because, of the fifty five items stipulated by WAEC standard and contained in the checklist, only twenty four (24) of them were observed to be adequate while the rest thirty one (31) items on the list were in adequate there by making the choice of alternative to practical an inevitable but bad option for the teaching and learning of biology in the schools.

Findings related to research question three in table 3 revealed that the few and inadequate biology laboratory facilities in Yobe state secondary schools are utilized by the students, as of the fifty five items on the list, thirty one (31) were observed to be utilized by the students which could impact positively on their performance in public external examinations.

Findings related to hypothesis 1 in Table 4 revealed that there was a positively strong correlation among the variables i.e. biology laboratory facility availability, adequacy and utilization and student academic achievement, therefore the null hypothesis (H_{O1}) was rejected. This implied that there was a significant strong relationship among facility availability, adequacy and utilization and student's academic achievement.

Conclusion

Based on the findings of this study, it was concluded that:

(i) Biology laboratory facilities which enhance and improve student's performance in biology were not available in most of the secondary schools in Yobe State.

(ii) Adequately furnished biology laboratories which improve students' learning outcomes in biology were observed to be inadequate in most of the Yobe state secondary schools.

(iii) Biology laboratory facilities which were mostly unavailable and inadequate were not maximally utilized in most of the secondary schools in Yobe state.

(iv) That a significantly positive relationship exist between availability of biology laboratory facilities and student's academic performance.

(v) That a significantly positive relationship exist between adequacy of biology laboratory facilities and student's academic performance.

(vi) That a significantly positive relationship exist between utilization of biology laboratory facilities and student's academic performance.

(vii) That a significantly positive relationship exist among availability, adequacy and utilization of biology laboratory facilities and student's academic performance.

Recommendations

From the result of the study, the following recommendations are made:

(i) It is evident that availability of biology laboratory facilities promotes learning of biology. Therefore Yobe state government and all other stakeholders of education should as a matter of priority make available these facilities in the schools.

(ii) Teachers of biology should be encouraged to practically teach biology through the use of the few available facilities in their schools to enhance understanding.

(iii) Biology teachers should also be motivated and encouraged to improvise where materials are not available in order to supplement the few available facilities in the school laboratories.

(iv) Science and Technical Schools Board should provide adequate laboratory facilities for the teaching and learning of Biology in schools in Yobe state

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ENHANCING QUALITY TVET EDUCATION THROUGH INNOVATIVE PEDAGOGY AND CONTINUOUS ASSESSMENT IN TERTIARY INSTITUTION IN BENUE STATE

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Abstract
The use of innovative pedagogy and continuous assessment for taking summative decisions on students' level of attainment at the end of any level of schooling as recommended by The Nigeria's National Policy on Education (NPE) this study is an attempt to evaluatequality of TVET education through innovative pedagogy and continuous assessment in tertiary institution in Benue state. The sample consists of 115 lecturers, randomly selected from six government owned tertiary institution in Benue state. Namely Benue State University, University of Agriculture Makurdi, Colleges of Education Oju, College of Education Katsina-Ala college of Agriculture yandev and Benue State Polytechnic Ugbokolo,Enhancing quality TVET through innovative pedagogy and continuous assessment questionnaire(EQTINPCSQ) was develop, validated and administered to one hundred fifteen lectures,the reliability index of the questionnaire was 0.75. The respondents answered to 34-item structured questionnaire. The result indicates that the items for enhancing quality of TVET education are available and teachers can access them easily for innovative pedagogy. While the Strategiesfor innovative pedagogy is available and teachers can use them to achieve for quality TVET. One the recommendation is that TEVT teachers to be allowed to go for refresher courses update their knowledge and improve skills on innovative pedagogy and continuous assessment

Keywords: Quality, TVET, innovative pedagogy and Continuous assessment, Tertiary institution

Introduction

Educators, administrators, Policy makers and stakeholders in education often view test scores as a measure of educational quality and use test scores to hold schools accountable for the quality performance of learners pupils, students or teacher(Andural and Agada, 2015) this has made testing an important component of education reform in our educational policy and environment. Testing is an alternative or supplement to high stakes assessment of learners achievement. This offers a methodology for measuring learners' performance and using those findings to improve the success of learner or the persons involved.

The Nigeria's National Policy on Education (2013) recommended the use of continuous assessment for taking summative decisions on the learners' level of attainment at the end of any level of schooling.While The*National Science Education Standards* (NRC, 2001), calls for changes in the ways to assess. this also call for innovative pedagogy ie way of teaching to achieve quality in activities of learning and the involvement of students in their own assessment.

Oguneye, (2002) described Assessment as a means whereby the teacher obtains information about knowledgegains, behavioural changes and other aspects of the development of learners. It involves the deliberate effort of the teacher to measure the effect of the instructional process as well as the overall effect of school learning on the behaviour of students. Assessment covers

all aspects of school experience both within and outside the classroom. It covers the cognitive, affective and psychomotor aspects of learning.

Rotenberg (2005) points out that Classroom Assessment is the observation of students in the process of learning, the collection of frequent feedback on students' learning, and the design of modest classroom experiments that provide information on how students learn and how students respond to particular teaching approaches. Classroom assessment helps individual college teachers obtain useful feedback on what, how much, and how well their students are learning. Faculty can then use this information to refocus their teaching to help students make their learning more efficient and more effective. The statistical tools will be used to present and analyze assessment data that will be presented in a very systematic manner. Therefore, the main thrust of this paper is enhancing quality TVET through innovative pedagogy and continuous assessment in tertiary institution in Benue state

TVET is simply technical vocational educationand training, TVET is difficult to trace as it connotes skills and competenciesacquisition which has been embedded in surplus of other histories. General education and training began in pre-history with the transmission of knowledge and culture from one generation to the next. In the pre-historic hunting and gathering society, skills were passed from parent to child as members of small, usually related, migratory groups. This education and training thatoccurred is best embodied in the Chinese proverb: Give a man a fish and he will eat for a day. Teach him how to fish and he will eat for a lifetime.Ekpehyong (2010) explained that the concepts of TVET is associated with education for work or a kind of education purposely designed to equip learners with professional competencies needed to fill the yeaning gap in manpower development for a sustainable economy.the National Teachers' Institute (NTI, 2008) described TVET as the type of education that involves the use of the right instructional devices, methods, techniques and knowledge for developing skills. While Gonzovic (2013) TVET is a systemic process of acquiring and upgrading requisite knowledge and skills needed for self-reliance. TVET is the education for those who need it, those who want it, and those who want to progress by it (Okoye, 2012). This implies that an individual who acquires those competencies and some psychomotor skills in TVET is already empowered to be self-reliant. Such individual has greater opportunities to earn a livelihood as well contribute to national development. Similarly the Federal Republic of Nigeria (2009) defined technical education as that aspect of education that leads to the acquisition of practical and applied skills as well as basic scientific knowledge. Again Technical education is a comparatively new phase of vocational education which is designed to meet the complex technological needs of modern industries. It should be noted that all technical education programmes are vocational but not all vocational education programmes are technical. This means that technical education is a sub-set of vocational education which can be achieved through innovative pedagogy and continuous assessment.

Transmission' or lecture model is the most highly used methods of teaching in twenty-first century where competencies and skills ineffective, yet widespreaduse of this model continues Saavedra and Opfer, (2012).posted that The 'transmission' or lecture model still prevails as the dominant instructional approach in education, despite worldwide agreement that learners need skills such as critical thinking and the ability to communicate effectively, innovate, and solve problems through negotiation and collaboration. This approach leads to indifference, apathy and for most learners, boredom. Most learners need to dedicate time to interacting with mentors, peers in practicing and applying newly acquired skills and knowledge. New learning must be assessed and shared with peers through well designed collaborative encounters that support individuals in adapting their learning to new problems and contexts. Without

opportunities to practise and apply new knowledge in a variety of contexts, adaptation and integration of new knowledge will not be achieved. Therefore the need for innovative pedagogy and continuous assessment arise. Innovative pedagogy must equip learners with the skills and competencies to function in a digital culture, using media and informal pathways to enrich their learning and develop essential forms of literacy. Teachers will require meaningful support and time to exploit available resources and tools to create tailor-made learning experiences that are motivating and engaging, yet efficient, relevant and challenging.

On continuous assessment, one policy that cuts across all educational levels throughout Nigeria. the National Policy on Education (revised 2004), which deals with the philosophy and goals of education in Nigeria, states that "educational assessment and evaluation shall be liberalized by their being based in whole or in part on continuous assessment of the progress of the individual" subsequently, this statement is well amplified in sections 4and 5 of the document involving Primary Education and Secondary Education which deals with the Planning, Administration and Supervision of Education**.** Thereforelooking closely at some of the definitions and meaning of continuous assessment Prigo, (2001) viewed Continuous Assessment as listening closely to students, observing students as they are engaged in learning, as they are engaged with materials, and trying to understand what they understand.

It points out that as a teacher every day, everything you do, observe your students, listen to their conversations, and talk with them about their ideas, writings, and drawings. Always striving to understand and expand students' thinking and skills, you use the daily input you gather to decide what next steps you'll take to support their growth. When these things are done in a purposeful way, they become a kind of formative assessment, which is refer to as "continuous" assessment or "everyday" assessment. Again Wikipedia, the free encyclopedia (2014) explained that continuous assessment is the educational policy in which students are examined continuously over most of the duration of their education, the results of which are taken into account after leaving school. It is often proposed or used as an alternative to a final examination system.it added thatcontinuous assessment characteristicsshould be comprehensive, cumulative, diagnostic, formative, guidance-oriented and systematic in nature .in a similar way Idowu, &Esere, (2009). continuous assessment refers to a systematic and objective process of determining the extent of a student's performance in all the expected changes in his behavior, from the day he enters upon a course of study and a judicious accumulation of all pieces of information derived from this purpose with a view to using them to guide and shape the student and to serve as basis for making important decisions about the child. In other words, continuous assessment should be systematic, comprehensive, and cumulative and guidance oriented.

Conceptually, enhancing quality TVET through innovative pedagogy and continuous assessment in tertiary institution in Benue state provides feedback to student and teachers. These feedbacks provide information that is used for the purposes of improving on the learner/student's performance or modifying the content, context and methods of teaching, and making variety of other decisions in Nigerian tertiary institution.

Three research questions guided the study:

(i) What are the items for enhancing qualities of TVET?
(ii) What are Strategies forinnovative pedagogy?
(iii) Which of the following continuous assessment contribute to innovative pedagogy?

The study employed a survey research design. Three research questions guided the study. The population consists of all lecturers in government owned tertiary institution in Benue state namely Benue State University, University of Agriculture Makurdi, Colleges of Education Oju, College of Education Katsina-Ala, college of Agriculture yandev and Benue State Polytechnic Ugbokolo. A sample of 115 respondents was used for the study. Simple random sampling technique by balloting was used to select the sample. The instrument for data collection is enhancing quality TVET through innovative pedagogy and continuous assessment questionnaire (EQTINPCSQ), two experts one in technical education and the other in measurement and evaluation face-validated the instrument. They made suggestions which were incorporated to make the instrument valid. The responses were analyzed using mean and standard deviation

Research Question One: What are the enhancing qualities of TVET?

Table1: mean and standard deviation onitems for enhancing qualities of TVET

Items of enhancing qualities of TVET	**X**	**SD**	**decision**
1. Equipped with set of visible skills	3.00	0.69	Agreed
2. Commitment to instructional material	3.38	0.71	Agreed
3. Acquisition of skills	2.88	0.75	Agreed
4. Transfer of experience	2.54	0.78	Agreed
5. Creating skills growth	2.82	1.70	Agreed
6. Creating new technologies	2.79	0.79	Agreed
7. Provides training and support	3.33	0.72	Agreed
8. Innovation and Creativity	3.30	0.73	Agreed
9. Values and aspiration	2.65	0.70	Agreed
10. Awareness	2.58	0.73	Agreed

The result from table 1: shows that items numbers 1, 2,3,4,5,7,8,9 and 10 were all agreed upon, this is because the mean response score is above 2.5. This means the items for enhancing qualities of TVET are available and teachers can access them easily for innovative pedagogy.

Research Question Two: What are Strategiesfor innovative pedagogy?

Table 2: Mean and standard deviation on StrategiesFor innovative pedagogy

Items forInnovative pedagogy	**X**	**SD**	**decision**
11. Crossover Learning	2.70	0.30	Agreed
12. Through Argumentation	2.65	0.22	Agreed
13. Incidental Learning	2.55	0.25	Agreed
14. Stealth Assessment	2.78	0.15	Agreed
15. Adaptive Teaching	2.60	0.28	Agreed
16. Context-Based	2.25	0.27	Agreed
17. Computational Thinking	3.55	0.24	Agreed
18. Analytics of Emotions	2.67	0.15	Agreed
19. Embodied Learning	3.33	0.19	Agreed
20. Doing Science	3.29	1.86	Agreed

The result from table 2: shows that items numbers 11, 12,13,14,15,17,18,19 and 20 wereall agreed upon, this is because the mean response score is above 2.50. This means the

Strategiesfor innovative pedagogy are available and teachers can access and use them to achieve for quality TVET.

Research Question Three: Which of the following continuous assessment contribute to innovative pedagogy?

Table1: Mean and standard deviation of continuous assessment contribute to innovative pedagogy?

S/N Item	X	SD	decisions
21. Formative assessment	3.17	0.78	Agreed
22. Summative assessments	2.92	0, 94	Agreed
23. Increased self-awareness	2.93	0.94	Agreed
24. Continuous Improvement	3.17	0.78	Agreed
25. Accountability chain in education	2.50	0.34	Agreed
26. Reduce the temptation to cheat.	3.90	0.23	Agreed
27. Focus on learning instead of grades	2.00	0.28	Disagreed
28.Systemic pressure performance	3.51	0.34	Agreed
29. measurable at each level.	1.60	1.47	Disagreed
30. Higher learning standards for all	3.90	0.23	Agreed
31. Reduce weaknesses	2.93	0.94	Agreed
32. Reduce Cheating and plagiarism	3.17	0.78	Agreed
33. Clarified purpose of assessment.	2.20	1.37	Disagreed
34. Increased sense of inclusiveness	3.90	0.23	Agreed

The result from table shows that items numbers 21, 22, 23,24,25,26, 28, 30, 31, 32 and 33 were agreedupon; this is because the mean response score is above 2.50. This means that they are the continuous assessment which can contribute to innovative pedagogy,while items 27, 29 and 33 were disagreed upon because the mean response score is below 2.50. this indicates that the items cannot contribute to innovative pedagogy achieve for quality TVET.

Conclusion

This study investigated enhancing quality TVET through innovative pedagogy and continuous assessment in tertiary institution in Benue state enhancing quality TVET through innovative pedagogy and continuous assessment questionnaire (EQTINPCSQ) was used to collect data. Any continuous assessment practices reflect a number of qualities TVET achieved through innovative pedagogy relating to the nature of teaching and learning and the purpose of assessment.

Recommendations

(i) TEVT teachers to be allowed to go for refresher courses update their knowledge and improve skills on innovative pedagogy and continuous assessment.

(ii) Teachers with requisite TVET teaching qualification be allowed to teach and apply innovative pedagogy and continuous assessment.

(iii) Ensure that innovative pedagogy and use of continuous assessment support quality TVET education of teachers as spelt out in the National Policy on Education.

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DEVELOPMENT OF AN INSTRUMENT FOR EVALUATING PERFORMANCE OF TEACHERS OF ELECTRICAL INSTALLATION AND MAINTENANCE WORKS AND ENHANCING QUALITY EDUCATION IN SCIENCE AND TECHNICAL COLLEGES IN NORTH-EASTERN STATE OF NIGERIA

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Abstract
This study was designed to develop an Instrument for Evaluating Performance of Teachers of Electrical Installation and Maintenance Works in Science and Technical Colleges. Four research questions and four hypotheses were posed to guide the study. A descriptive survey research design was employed for the study. A population of 590 respondents, consisting of 50 administrators, 60 technical teachers and 480 National Technical Certificate students (NTC III 2007/2008) were used for the study in Science and Technical Colleges in North Eastern States of Nigeria. Sixty-seven items questionnaire was developed from literature reviewed. The instrument was validated in terms of both face and content by lectures in Technology Education Departments of Abubakar Tafawa Balewa University Bauchi, Federal University of Technology Yola and Technical Teachers in the area of study. Its reliability and validity were established and were found to be within acceptable range. The reliability coefficient of 0.64, 0.70, 0.79 and 0.70 for sections A B C and D respectively were established. The findings of the study revealed that: (1) items on the questionnaire were found appropriate and required for evaluating performance of teaches of EIMW, (2) The developed instrument was found reliable, it yielded a reliability coefficient of 0.71, (3) the result of the four null hypotheses revealed that there is no significant difference between the mean opinions of all the groups of respondents on appropriate and required items for evaluating performance of teachers of EIMW. The results of this study have implications for Management of Boards of science and Technical Colleges and other relevant bodies. There is the need to consider evaluating performance of teachers of EIMW using this newly developed instrument in order to determine their strengths and weaknesses in carrying out their professional duties. The researcher recommended that the result of this study be made available to Management of Boards of Science and Technical Colleges for their consideration as an alternative appraisal form.

Keywords: Instrument, Evaluation and Performance.

Introduction

Instrument is a term defined by various scholars in different ways. According to Sinclair (1992) an instrument is a tool or device that is used to do a particular task. Hornby (2006) defined an instrument as something that is used by people in order to achieve a purpose. Thus, an instrument could be defined as a device used for a particular task especially for scientific work. It is a thing that makes something to happen.

Uzoagulu (2006) described an instrument as the appliance which enables one too btain set of numbers for some observations made in physical sciences and social sciences. Physical sciences involved using instruments to determine physical features or attribute of objects or materials. That is determining length, width, height, weight, volume of an object. Social sciences involved mental evaluation seeking to determine behaviour attributes or changes or features of the individual in terms of how much learning has been acquired by a learner.

Instruments are developed and used in different fields such as engineering, military, physical science, medicine, education, and other fields, whose activities involve evaluation in order to make a decision. In making decisions on programme, personnel and performance, evaluation is vital. According to Okoro (1991) evaluation can be viewed as:

> a process of collecting and processing data relating to an educational programme, on the basis of which decision can be made about the programme. The data may be objective description of goals, environment, personnel, methods and content and recorded personal judgements of the quality and appropriateness of the goals, inputs and outcomes. Evaluation can be defined as the appraisal of the worth and value of a thing, action, and the making of appropriate decision on thebasis of such appraisal. Human beings are always faced with evaluation decisions. When teachers choose one method of teaching over another, they do so, on the basis of an evaluation of the factors involved and the objectives to achieve. Teachers do administered exams to students, marked, and scored the performance of students on basis of the scores of the students in an exam decision is made. Whether the students have passed or failed the examination (p.5).

Evaluation in education involves the collection of data and the use of such data to assess success and failure of a programme or performance. Success and failure could be assessed using an instrument. In the past evaluation was seen only in terms of evaluating students' performance. In teaching and learning situation, before evaluating the performance of students, the learners have to be taught. During the process of teaching students skills, knowledge and attitudes, teachers perform activities such as lesson preparation and delivery, conduct practical in workshops, maintain equipment, tools evaluate students outcomes, provide guidance and career information to the students. According to Olaitan, Nwachukwu, Onyemachi, Igbo and Ekong (1999) performance is defined as an impact of groups of activiti es performed towards the achievement of learning outcome. Teaching involves performing a group of activities by the teacher, which can be viewed in terms of teacher' srole. Teacher's performance is however, based on the teacher's role. Havighurst (1981) positsseven roles performed by the teachers in the school.

These roles are:

(i) Mediator of learning,
(ii) Disciplinarian and controlled of student behaviour,
(iii) Parents substitute,
(iv) Confidant to students,
(v) Organizer of curriculum,
(vi) Scholar and research specialist, and
(viii) Member of teacher's organization.

With reference to the teacher in formal education, Lassa (1993) stated that the teacher is the initiator of the learning process, the facilitator of the learning skills, the coordinator of the learning sequence, the assessor of the learning efficiency, and indeed the pivotal element in the entire educational development. The roles of teachers of electrical installation and maintenance works would be based on the electrical engineering trades that make up electrical installation and maintenance works (EIMW). The electrical engineering trades are: domestic and industrial installation, cable jointing and battery charging, and electrical machines.

An instrument for evaluating roles or performance of teachers of EIMW needs to be developed based on educational objectives. Educational objectives are based on the goals to teachers education which is derived from the overall philosophy of Nigeria. According to Nigeria High Commission (Ottawa, 2008) the national policy on education was formulated in realization that education is the greatest force or instrument that can be used to bring about change. It is also the greatest investment that a nation can make for the development of its economic, political, sociological and human resources. National Policy on Education (Federal Republic of Nigeria, 2004, 2008, 2014) stated that the philosophy of Nigeria is to:

(i) Live in unity and harmony as one indivisible, indissoluble, democratic and sovereign nation founded on the principles of freedom, equality and justice.
(ii) Promote inter-African solidarity and world peace through understanding (p.6)

The national philosophy is used to produce the goals of teacher education. The goals of teacher education are to:

(i) Produce highly motivated, conscientious and efficient classroom teacher's for all levels of our educational system,
(ii) Encourage further the spirit of enquiry and creativity in teachers,
(iii) Help teachers fit into social life of the community and the society at large and enhance their commitment to national goals,
(iv) Provide teachers with the intellectual and professional background adequate for their assignment and make them adaptable to changing situation,
(v) Enhance teacher's commitment to the teaching profession (FRN, 2004 P.39).

In order to realize or achieve goals of teacher education, tertiary institutions are set up by States and Federal Government to train teachers in different fields of specialization leading tothe award of certificate. Aliyu (1992), National Commission for Colleges of Education (NCCE, 2003), and FRN (2004) stated that teachers are professionally trained in fields like general education, science, social science, vocation and technical education among others.

According to FRN (2004) the under listed institutions shall give the required professional training needed by teachers: Colleges of Education, Faculties of Education, Institutes of Education, National Teachers Institutes, Polytechnics, National institute for Nigerian language (NINLAN), National mathematics Centre (NMC).

Aliyu (1992) stated that teachers professionally trained in various fields of specialization on completion of their specified courses in the programme, are certificated with qualifications as Nigerian Certificate of Education (NCE), Bachelor degree, masters degree and Doctor of Philosophy Industrial technology education among others. Aliyu (1992) observed that teachers having been certificated are employed by the civil service at State and Federal level through the Federal Ministry of education and Science and technical schools boards.

Teachers employed with NCE Certificate are posted to schools to teach introductory technology at junior secondary school. While technical teachers with bachelor degree intechnology education are posted to teach at senior secondary schools and science andtechnical colleges.
Technical teachers of electrical installation and maintenance works (EIMW) performed certain activities, while teaching electrical engineering trades (EET) to students inscience and technical Colleges. Aliyu (1992) enumerated some of the activities performed by teachers as imparting skills, knowledge and attitudes of the subject matter, using various teaching methods to facilitate learning carrying out administrative activities as guidance, provide career information,

welfare to students, manage instructional materials, keep school records, assess students and provide progress report and inculcate right attitudes and values(Psycho-social aspects) to the students.

Developing an instrument for evaluating performance of teachers of EIMW will need to be based on electrical engineering trade functions, administrative functions, pedagogical principles, attitudes and values (psycho-social aspects). Teachers teach students to acquires kills, knowledge and attitude in electrical engineering trades (EET). Performance of teachers will have an impact on students' outcome in electrical engineering trades (EET) among others. Therefore, teachers who teach students to acquire and apply skills, knowledge and attitudes in EET in science and technical colleges need to be evaluated. The teachers need to be evaluated so as to monitor their performance.

How are the performances of teachers of EIMW being evaluated? Aliyu (1992) and NCCE(2003), (2012) stated that teachers while undergoing professional training are evaluated using test, assignment, experiment, project among others. At present the performance of teachers teaching trade skills in science and technical colleges are evaluated using Annual Performance Evaluation Report (APER General, 1976). APER evaluate general performance of teachers irrespective of their area or field of specialization. This suggest that there is need to develop an instrument for evaluating performance of teachers based on their teaching subject, course and modules, in addition to APER. According to National Business and Technical Examination Board (NABTEB, 2007) a professional trained teacher of EIMW should possess skills, knowledge and attitudes in electrical engineering trades (EET) an dother trade related courses like building and engineering drawing. Olaitan (1996) stated that teachers need to possess, impact and evaluate skills, knowledge and attitudes in EET and related trade courses using modules. Teachers of EIMW need to possess and apply pedagogical principles, administrative principles and theories in teaching students trade skills. The teachers need to possess personal attributes (or psycho-social aspects) that can be inculcated into the students in science and technical colleges.

Performances of teachers of EIMW as human resources are part of the input evaluation. Input evaluation is a sub-component of context, input process and product evaluation (CIPP) model. Okoro(1991) stated that input evaluation seeks to describe the human and material resources put into the educational programme in achieving the objectives of the programme. Teachers of EIMW are the human resources employed to teach students in science and technical colleges. The availability of teachers of EIMW will provide an opportunity to evaluate their performance. Developing an instrument for evaluating performance of teachers of EIMW in teaching electrical engineering trades is vital. The instrument when developed will assist in monitoring the performance of teachers. This study seeks to develop an instrument for evaluating performance of teachers of Electrical Installation and Maintenance Works (EIMW) in Science and Technical Colleges in North-Eastern States of Nigeria.

Statement of the Problem

Teachers teach students to acquire skills, knowledge and attitudes in Electrical Installation and Maintenance Works (EIMW) in Science and Technical Colleges. Science and technical colleges provide facilities and admit students. The interaction between facilities and students is brought to play through the performance of teachers. Wahala (2001) argued that the presence of facilities and students would hardly bring about acquisition of skills, knowledge and attitudes without teacher's performance.

Teachers remain influential in the teaching and learning process. Facilities assist in instructional process, while teachers provide primary sources of direction in the teaching and learning situation. There is need to evaluate performance of teachers using an instrument. Alake (1996) stated that performance of teachers could have a profound influence on students' outcome and services to be rendered by the students to the public in electrical engineering trades (EET).

Thus, it raises the question; how are performances of teachers of EIMW in teaching students electrical engineering trades evaluated? Although performances of teachers are presently being evaluated based on general instrument called Annual Performance Evaluation Report (APER), the APER only deal with general performance of teachers irrespective of their area or field of specialization. This suggests that there is the need to develop an instrument for evaluating performance of teachers based on teaching subject, course, and modules in addition to APER.

This is because an instrument for evaluating performance of teachers of EIMW needs to be based on their knowledge and skills in electrical trades, pedagogical principles, administrative functions and psycho-social aspects in teaching students. The question the study intends to answer on completion is: what is the appropriate instrument for evaluating performance of teachers of EIMW in Science and Technical Colleges in North-Eastern States of Nigeria?

Purpose of the Study

The purpose of the study is to develop an instrument for evaluating performance of teachers of Electrical Installation and Maintenance Works (EIMW) in Science and Technical Colleges in North-Eastern States of Nigeria. The specific objectives of the study are to:

(i) Develop an instrument for evaluating performance of teachers of EIMW in imparting electrical engineering trades (EET) skills to students in science and technical colleges.
(ii) Develop an instrument for evaluating performance of teachers of EIMW in using pedagogical principles in imparting EET trades to students in science and technical colleges.
(iii) Develop an instrument for evaluating performance of teachers of EIMW in their administrative functions in imparting EET trades to students in science and technical colleges.
(iv) Develop an instrument for evaluating performance of teachers of EIMW in the psycho-social aspects in imparting EET trades to students in science and technical colleges.

Research Questions

The study consciously set out to answer the following questions:

(i) What are the appropriate items required for evaluating performance of teachers of EIMW in imparting EET to students in science and technical college?
(ii) What the appropriate items required for evaluating performance of teachers of EIMW in using pedagogical principles in imparting EET to students in science and technical colleges?
(iii) What are the appropriate items required for evaluating performance of teachers of EIMW in administrative functions in imparting EET to students in science and technical colleges?
(iv) What are the appropriate items required for evaluating performance of teachers of EIMW in psycho-social factors in imparting EET to students in science and technical colleges?

Research Hypotheses

The following hypotheses were tested at 0.05 level of significance:

(i) There is no significant difference between the mean opinions of administrators and technical teachers on the appropriate items required for evaluating performance of teachers of EIMW in imparting EET to students in science and technical colleges.

(ii) There is no significant differences between the mean opinions of administrators and technical teachers on the appropriate items required for evaluating performance of teachers of EIMW in using pedagogical principles in imparting EET to students in science and technical colleges.

(iii) There is no significant difference between the mean opinions of administrators and technical teachers on the appropriate items required for evaluating performance of teachers of EIMW in administrative functions in imparting EET to students in science and technical colleges.

(iv) There is no significant difference in the mean opinions of administrators, technical teachers and students on the appropriate items required for evaluating performance of teachers of EIMW in psycho-social factors in imparting EET to students in science and technical colleges.

Significance of the Study

The findings of the study, when completed, would be beneficial to Management Board of Science and Technical Colleges: who will get information on an instrument for evaluating performance of teachers teaching electrical engineering trades to students. Administrators of science and technical colleges could use the result of the study to evaluate performance of teachers of EIMW and enable them to advice the teachers where necessary. Teachers will benefit by having insight on an instrument for evaluating their performance, thereby would be spurred to perform their duties diligently and seriously.

Literature Review

Related literature reviewed was based on electrical engineering trade functions of teachers of EIMW in science and Technical Colleges. Electrical engineering trade functions in this study mean activities performed by teachers of electrical installation and maintenance works (EIMW) in teaching students component trades. The component trades are called electrical engineering trades (EET). According to National Business and Technical examination Syllabus (NABTEB, 2007:p.26) electrical engineering trade functions are:

> Draw electrical installation from a given house plan. Wire an installation of two lighting point controlled by independent switches. Wire a lighting point is controlled by two (2) way switches. Identify symbols used in electrical drawing plan. Interpret distribution system from drawing plan. State advantages and disadvantages of conduit. List and explain types of conduit. Teach students IEE regulations and protective devices i.e circuit breakers. State types of installation tests, i.e. polarity test. Discuss electrical lamps. Demonstrate the wiring system for industrial installation. State the use of MICC cable. State I.E.E. safety regulations on industrial installation.

Cable joining forms part of electrical engineering trades. Some of the electrical engineering trade functions of teachers are: Identify tools and materials used for cable joining, state the use of tools like blow lamp. Describe the methods of cable joining. State advantages and disadvantage of conducting materials. Demonstrate how to make a cable joint, state the application of solder to cable joints. Apply I.E.E. regulations on cable joints (NABTEB Syllabus, 2007: 269).

Battery charging is another aspect of electrical engineering trades. A battery is that which stores chemical energy and converts it into electrical energy. Thus, teachers teach students skills and knowledge in battery charging. An instrument would be developed on the electrical engineering trade functions of teachers in battery charging. The trade functions of teachers are: identify types of cells, explain the working principles of primary and secondary cells, identify features of secondary cells, construct a simple cell or battery, use charger to demonstrate how to charge a secondary cell. Apply I.E.E. regulations in charging situations like room, laboratory and workshop. Explain use of control gears like switches, fuses and circuit breakers in charging conditions (NABTEB, 2007:272).

Another vital component of electrical engineering trades is electrical machines. Electrical machines are devices that develop force of attraction and of alignment (Thornes, 1995). According to Wilson (1997) and Bird (2001) electrical machines are classified into generator and motors. Generator converts mechanical energy into electrical energy while electric motor converts electrical energy into mechanical energy.

Electrical machines such as generators and motors have windings (Matt, 1980; Morley and Huges, 1985). The windings are made from copper materials capable of conducting current. Donelly (1980) and Thompson (1983) stated that the importance of windings is viewed on the basis of their application in electrical machines. The windings are also called coils, and are used for main fields and for armature fields. Technical teachers teach students skills, knowledge and attitudes in electrical machines in science and technical colleges. Some of the electrical engineering trade functions of teachers of EIMW are: identify types of electrical machines; state application of electrical machines. Describe basic features of an electrical machine. Sketch some basic features of electrical machines e.g. main field, armature. Demonstrate how to install basic electrical machines. Teach students how to read information on name plates of electrical machines. Teach students to apply I.E.E regulations on basic electrical machines. Demonstrate how to operate basic electrical portable tool, i.e. handdrill (NABTEB Syllabus, 2007 p.266).

Research Methodology

Research Design

This study will employ descriptive survey research design. According to Best and Kahn (2002) survey design is used in a situation where the study employs questionnaire to determine opinions, preferences, attitudes and perception of people about an issue. The descriptive survey would be considered appropriate for this study, since it seeks the response of administrators, technical teachers and students on an instrument for evaluating performance of teacher of Electrical Installation and Maintenance Works (EIMW) in Science and Technical Colleges in North-Eastern States.

Population of the Study

The population of the study was 590. It consisted of 50 administrators, 60 technical teachers and 480 National Technical Certificate (NTC III 2007/08 Session). Furthermore, the entire population of 590 was used for the study. Uzoagulu (1998) maintained that in a study using the whole subjects or objects, sample and sampling technique are not employed, because total population was used, there was no need for sampling. Consequently, in this study, the whole population was employed.

Instrument for Data Collection

Instrument for data collection was a questionnaire named, Format for Eliciting Information on Appropriate Items required for Evaluating Performance of Teachers Rating Scale (FEPTRS) for teachers of Electrical Installation and Maintenance Works. The format was developed by the research from the literature reviewed. The format was structured on a five-point rating scale. The response categories were: Very Highly Required (VHR)5 points, Highly Required (HR) 4 points, Moderately Required (MR) 3 points, Low Required (LR) 2 points and Least Required (LR)1 point.

Validation and Reliability of the Instrument

The format was validated in term of face and content validity by experts made up of five technical teachers in the study area and two lecturers from department of technology education, Federal University of Technology, Yola. The reliability of format was established through trial-test on 40 respondents outside the study area. Using Cronbach Alpha technique the 31 items of electrical engineering trade (EET) yielded a coefficient alpha of 0.85.

The format as a questionnaire was administered to the respondents by six (6) research assistants who were trained on how to administer it to the subjects in their locations. The questionnaire distributed to the respondents were completed and retrieved by the researchers via the research assistants. The interval of two days were allowed for respondents to complete the format after which the researcher retrieved the completed format. The returned rate was 95%.

Data obtained from the respondents was analyzed using mean (X) to answer the research questions. z-test was used to test the hypothesis at 0.05 level of significance. Excel solver software package results (ESSP) was used to analyse the data. Decision cutoff point was 3.0 and above for required items.

Method of Data Collection

The format as a questionnaire will be administered to the respondents with the help of six research assistants. The direct administration will enables the researcher and the co-researchers will help to interpret the items in the format to the students at National Technical Certificate III for them to respond to items in section D. The six research assistants will be trained on how to interpret or guide the students to respond to the items in section D.

Method of Data Analysis

Data obtained from the respondents will be analysed usmg mean (X) to answerresearch questions. Z-test and one-way analysis of variance (ANOVA) will be used to test thefour null hypotheses for the study at 0.05 level of significance. The data for the study will beanalysed using Excel Solver Software Package Result (ESSP).

Presentation of Results

The results of the study are presented based on the research questions and hypotheses.

Research Question 1

What are the appropriate items required for evaluating performance of teachers of EIMW in teaching electrical engineering trades (EET) to students?

Table 1:Mean opinions of Administrators and Technical Teachers on Items Required for Evaluating Performance of Teachers in EET.

S/N	Items on Electrical Engineering Trades	X_1 N = 50	X_2	X_3 N = 60	Remarks
1	Interpret symbols in electrical drawing	4.18	3.98	4.08	R
2	Indicate position of accessories in electrical drawing	3.66	3.50	3.58	R
3	Teach students safety precaution in electrical w/shop	3.56	3.80	3.68	R
4	Identify sizes of different cable	3.64	3.90	3.77	R
5	State functions of wiring accessories e.g switches	3.50	3.78	3.64	R
6	Apply I.E.E. regulation to protect surface wiring	3.56	3.88	3.72	R
7	Identify types and sizes of conduit	3.72	3.50	3.61	R
8	State advantage and disadvantages of conduit Wiring system	3.62	3.65	3.63	R
9	Terminate conduit at metal box	3.83	3.87	3.85	R
10	Carry out installation of simple protective device like fuse	3.30	3.57	3.44	R
11	Describe features of protective devices	4.04	3.83	3.94	R
12	Use megger meter to carry out test like polarity	3.48	3.68	3.58	R
13	Terminate MICC cable using appropriate	4.04	3.72	3.88	R
14	State advantages and disadvantages of MICC cable	3.40	3.88	3.64	R
15	Describe trunking wiring system	3.92	3.92	3.92	R
16	State advantages and disadvantages of trunking Wiring system	3.66	3.97	3.69	R
17	Apply I.E.E. regulation trunking wiring System should be protected from corrosion	3.72	3.97	3.85	R
18	Dram diagram of cable joints	3.66	3.72	3.69	R
19	Carry out simple cable joint	3.28	3.73	3.51	R
20	Use tin-man solder on cable joint	3.70	3.73	3.72	R
21	Dram diagram of armoured cable	3.50	3.77	3.64	R
22	Terminate armoured cable	3.60	3.50	3.55	R
23	Draw construction features of secondary cells	4.08	3.65	3.87	R
24	Describe the principles of operation of a secondary cell	3.78	4.12	3.95	R
25	Able to charge secondary cells	3.96	3.40	3.68	R
26	Apply I.E.E. regulation in a charging room	3.78	4.12	3.95	R
27	Sketch diagram of construction feature of an Electrical machine	3.94	3.80	3.87	R
28	State basic principles of operation of an electrical machine	3.72	3.85	3.79	R
29	Carry out maintenance of electrical tools	4.00	3.92	3.56	R
30	Use fire extinguisher in case of fire outbreak	3.64	3.80	3.72	R
31	Apply first Aid in case of accident in electrical Workshop	3.90	3.78	3.84	R

Table 1 shows that 5 items were rated 4.00 and above. The rest of the items were rated 3.30. This shows that all respondents agreed that all items in table 1 are appropriate and required of

an instrument for evaluating performance of teachers of EIMW in EET). Thus, all items in table 5 should be included in the instrument.

Research Question two: What are the appropriate items required for evaluating performance of teachers of EIMW in using pedagogical principles to teach students EET?

Table 2: Mean opinions of Administrators and Technical Teachers on items required for Evaluating Performance of Teachers of EIMW in their use of Pedagogical Principles

S/N	Items on Electrical Engineering Trades	$\bar{X}_1$ N = 50	$\bar{X}_2$ N =60	$\bar{X}_3$	Remarks
32	Use lecture method to clarify laws, concepts, etc	4.12	3.97	4.05	R
33	Apply demonstration method to impart skills to students	4.04	3.87	3.96	R
34	Take students to field trip	3.66	3.77	3.72	R
35	Give students assignment in theory and practical lessons	3.04	3.86	3.45	R
36	Employ questioning technique to allow students participation in lessons	3.92	3.70	3.81	R
37	Employ teaching aids to facilitate learning among students	3.48	3.82	3.65	R
38	Use project method for skills acquisition by students	4.12	4.00	4.06	R
39	Use tutorials to reinforce learning among students	3.78	3.72	3.75	R
40	Assess students through tests, etc	3.52	3.67	3.60	R
41	Provide feedback to students, school and parents	3.32	4.07	3.70	R

Table 2 revealed that the mean responses of the groups are from 3.04 and above. This signifies that all the items in Table 2 have been rated as appropriate and required by both groups of respondents. Thus all the 10 items are to use for evaluating performance of teachers of EIMW in their use of pedagogical principles.

Research Question Three

What are the appropriate items required for evaluating performance of teachers of EIMW in administrative functions in teaching EET to students?

Table 3: Mean opinions of Administrators and Technical Teachers on Items Required for Evaluating Performance of Teachers of EIMW in their Administrative Functions

S/N	Items on Electrical Engineering Trades	$\bar{X}_1$ N = 50	$\bar{X}_2$ N =60	$\bar{X}_3$	Remarks
42	Manage class	3.92	3.70	3.81	R
43	Manage instructional materials	3.18	3.85	3.52	R
44	Supervise students in learning activities	3.70	3.97	3.84	R
45	Liaise with parents on students matters	3.54	3.95	3.75	R
46	Provide good leadership to students	3.96	3.73	3.76	R
47	Prepare statement of behavioural objectives	3.60	3.92	4.32	R

	of a lesson				
48	Develop lesson based on subject matter	4.12	4.52	4.13	R
49	Present lesson sequentially to students	4.13	4.12	3.80	R
50	Keep students performance records	3.86	3.73	3.22	R
51	Provide career information to students	3.96	3.68	3.82	R

Table 3 showed that the mean responses of all the groups are above 3.00. This indicates that all the items in Table 3 are rated appropriate and required by both groups of respondents; thus all the items are to be used for evaluating performance of teachers of EIMW in their administrative functions.

Research Question Four

What are the appropriate items required for evaluating performance of teachers of EIMW in their psycho-social factors in teaching EET to students?

Table 4: Mean opinions of Administrator, Technical Teachers and Students and Items Required for Evaluating Performance of Teachers of EIMW in their Psycho-Social factors

S/N	Items on Electrical Engineering Trades	$\bar{X}_1$ N = 50	$\bar{X}_2$ N =60	$\bar{X}_3$	$\bar{X}_4$ N=480	Remarks
52	Patience	3.90	4.05	3.52	3.82	R
53	Punctuality	3.72	3.88	3.58	3.73	R
54	Neat in appearance	3.76	3.92	3.78	3.78	R
55	Self-Control	3.98	3.60	3.57	3.72	R
56	Friendliness	3.68	3.85	3.43	3.65	R
57	Respect for others	3.96	3.52	3.57	3.66	R
58	Allow students to ask or answer questions	3.74	3.82	3.42	3.66	R
59	Creativity	3.42	3.49	3.50	3.47	R
60	Competence	3.98	3.70	3.45	3.70	R
61	Firmness	3.72	3.43	3.38	3.51	R
62	Numerical ability	3.42	3.70	3.65	3.59	R
63	Accept duty	4.06	3.67	3.48	3.74	R
64	Oral expression	3.78	3.50	3.60	3.63	R
65	Honest	3.70	4.03	3.68	3.80	R
66	Good judgment	4.02	3.75	3.64	3.80	R
67	Respect others' opinion	3.96	3.52	3.51	3.66	R

Table 4 reveals that all the items have been rated appropriate and required by both groups of respondents, since calculated means are above 3.00. This indicated that all the items in Table 4 are to be used for evaluating performance of teaching electrical engineering trade to students, in science and technical colleges.

Hypothesis One

There will be no significant difference between the mean opinions of administrators and technical teachers on the appropriate items required for evaluating performance of teachers of EIMW in electrical engineering trades functions.

Table 5: z-Test Result Comparing Mean Opinions of Administrators and Technical Teachers on Items Required for Evaluating Performance of Teachers in EET Functions.

Group	N	$\bar{X}$	σ	Standard	z-cal	z-crit	Decision

				Error			
Administration	50	3.67	1.08				
				1.09	0.08	1.96	Accept
Technical Teachers	60	3.76	8.41				

Table 5 shows that z-calculated value of 0.08 at 0.05 level of significance is less than the critical value of 1.96. Therefore, the null hypothesis is accepted. This indicates that there is no significant difference between the opinions of administrators and technical teachers on items of EET to be used for evaluating performance of teachers of EIMW in science and technical colleges.

Hypothesis Two

There will be no significant difference between the mean opinions of administrators and technical teachers on the appropriate items required for evaluating performance of teachers of EIMW in their use of pedagogical principles.

Table 6: z-Test Result Comparing Mean Opinions of Administrators and Technical Teachers on Items Required for Evaluating Performance of Teachers of EIMW in their use of Pedagogical Principles.

Group	**n**	$\overline{X}$	**σ**	**Standard Error**	**z-cal**	**z-crit**	**Decision**
Administration	50	3.67	0.88				
				0.18	0.39	1.96	Accept
Technical Teachers	60	3.83	1.02				

Table 6 indicates that z-calculated value of 0.39 at 0.05 level of significance is less than the critical value of 1.96. Therefore, the null hypothesis is accepted and the alternative rejected. This implies that there is no significant difference between the mean opinions of administrators and technical teachers on the items required for evaluating performance of teachers of EIMW in their use of pedagogical principles in teaching students EET in science and technical colleges.

Hypothesis Three

There is no significant difference between the mean opinions administrators and technical teachers on the appropriate items required for evaluating performance of teachers of EIMW in their administrative functions.

Table 7: z-Test Result Comparing Mean Opinions of Administrators and Technical Teachers on Items Required for Evaluating Performance of Teachers of EIMW in their Administrative Functions

Group	**n**	**X**	**σ**	**Standard Error**	**z-cal**	**z-crit**	**Decision**
Administration	50	3.71	0.98				
				0.17	0.53	1.96	Accept
Technical Teachers	60	3.77	0.81				

Table 7 shows that z-calculated value of 0.53 at 0.05 level of significance is less than the critical value of 1.96. Therefore, the null hypothesis is accepted and the alternative rejected. This implies that there is no significant difference between the mean opinion of administrators and

technical teachers items required for evaluating performance of teachers of EIMW in the administrative functions in teaching electrical engineering to students in science and technical colleges.

Hypothesis Four

There will be no significant difference in the mean opinions of administrators, technical teachers and students on the appropriate items required for evaluating performance of teachers of EIMW in their psycho-social factors in teaching EET to students.

Table 8: ANOVA result comparing mean opinions of administrators, technical teachers and students on items required for evaluating performance of teachers of EIMW in their psycho-social factors

Source of Variance	Sum of Square	DF	Mean	F-cal	F-crit	Decision
Between Groups	0.0083	2	0.004			
				0.003	3.01	Accept
Within Groups	758	558	1.358			
Total	7.58	0.0083	560			

Table 8 revealed that an F-calculated value of 0.003 at 0.05 level of significance is less than F-critical value of 3.10. Thus, the null hypothesis is accepted. This implies that there is no significant difference in the opinions of the three groups of respondents on items required for evaluating performance of teachers of EIMW in their psycho-social factors in the teaching electrical engineering trades to students in Science and Technical Colleges.

Discussion of Findings

The findings of the study are discussed in relation to the findings of the study. The first of finding on appropriate items required on Electrical Engineering Trades (EET) to be used for evaluating performance of teachers of EIMW in Science and Technical Colleges. The finding revealed the items on EET to be included in the instrument. This is because the items on electrical engineering trades were rated 3.30 and above by all respondents. The finding is in agreement with National Policy on Education (FRN, 2004) states that teachers will be equipped with knowledge, skills and attitudes to enable them perform their duties effectively.

One of the duties performed by teachers of EIMW is to teach students to acquire skills, knowledge and attitudes in EET. Teachers of EIMW need to possess skills during their training to enable them teach the students how to acquire skills in trade subjects. An instrument for evaluating performance of teachers of EIMW should consist of items on EET in order to ensure that teachers of EIMW possess the requisite skills and are demonstrating such skills to the students during practical lessons. According to NABTEB (2007), Electrical Installation and Maintenance Works is made up of electrical engineering trades. Teachers of EIMW should master their subject matter. Mastering electrical engineering trades means possessing the skills and then being able to teach such skills to students in Science and Technical Colleges. The inclusion of items on EET is vital in an instrument for evaluating performance of teachers of Electrical Installation and Maintenance Works.

The second findings on appropriate items required for evaluating performance of teachers of EIMW in their use of pedagogical principles. The finding is in line with educators such as

Ahimade (1997), Wondung (2002), Oyetunde (2004), Daudu and Kukwi (2004) and Mangvwat (2004) who stated that for students to be guided to acquire skills, knowledge and attitudes in their learning experiences, teachers should use various methods of teaching (or pedagogical principles). For students to acquire skills, knowledge and attitude in electrical engineering trades (EET), they should be taught using pedagogical principles. The use of various methods of teaching helps students to learn what they have been taught. According to National Policy on Education (FRN, 2004), one of the objectives of Technical and Vocational education is to provide the technical knowledge and vocational skills for necessary agricultural, commercial and economic development. Technical teachers need to use various methods of teaching in guiding the students to acquire vocational skills. Evaluating performance of teachers of EIMW ought to be based on their ability to use pedagogical principles in teaching EET skills to students. This necessitates the inclusion of items on pedagogical principles for evaluating performance of teachers of EIMW inn Science and Technical Colleges.

Thirdly, the findings revealed the appropriate items required for evaluating performance of teachers of EIMW in their administrative functions. The items on administrative functions yielded a mean of 3.18 and above from all the groups of respondents. The finding is in agreement with the works of Lassa (1993), Wazis (1994), Wahala (2001), Makeri and Opadeyi (2002) who outlined administrative functions of teachers such as managers, facilitators of learning, parent substitute among others. Furthermore, Teachers Registration Council (T.R.C.N., 2004) agreed that teachers performed administrative functions such as inspiring students to study hard, provide good leadership, keep and maintain records. Technical teaches like those of Electrical Installation and Maintenance Works should be evaluated based on their administrative functions. Evaluating performance of teachers of EIMW using an instrument will help to judge the teachers as to whether they are carrying out their administrative functions or not. This implied that all items on administrative functions should be used for evaluating performance of teachers of EIMW in Science and Technical Colleges.

Fourthly, the findings of the study show that the items of Psycho-social aspects are required and should be used for evaluating performance of teachers of EIMW in their Psycho-social factors. The items on Psycho-social factors were rated 3.18 and above by all the groups of respondents. The finding is in consonance with the work of Yakubu and Jacob (2004) who found out that the affective attributes pre-eminent in teaching and learning processes are friendliness, cooperation, good judgment, creativity, enthusiasm, among others.

Dangana (2007) also came up with affective adjustment competencies needed by graduates of vocational and technical education in Nigeria. These affective adjustment competencies included punctuality, resourcefulness, adaptability, neatness, patience, honesty, among others. An instrument for evaluating performance of teachers of EIMW needs to contain items relating to affective attributes of the teachers in terms of attitudes and characteristics. The National Policy on Education (FRN, 2004) stated that teachers shall be provided with the intellectual and professional background, adequate for their assignment and make them adaptable to changing situations. The personality of the teacher can influence students' learning outcome. Evaluating the personality of the teachers teaching EET to students can help to ascertain whether the teachers of EIMW are relating with the students properly or not in science and technical colleges. The use of appropriate items required on Psycho-social factors in an instrument for evaluating performance of teachers of EIMW is vital and cannot be over-emphasized.

Hypothesis 1 compared the mean opinions of administrators and technical teachers on appropriate items required on EET to be used for evaluating performance of teachers of EIMW

in science and technical colleges. The result revealed that there was no significant difference between the mean ratings of the two groups for the items on EET skills. This indicates that the items on electrical engineering trades are required of the instrument. The used of items on electrical engineering trades for evaluating performance of teachers, according to the National Policy of Education (FRN, 2004), would test the professional competency of teachers of EIMW in teaching students electrical engineering trades in Science and Technical Colleges. Hypothesis 2 compared the mean opinions of administrators and technical teachers on appropriate items required for evaluating performance of teachers of EIMW in their use of pedagogical principles.

The result revealed that there was no significant difference between the mean ratings of the two groups of respondents on items on pedagogical principles. This implies that all the items on pedagogical principles are appropriate and should be used for evaluating performance of teachers of EIMW in science and technical colleges. Educators like Wondung (2003) and Mangvwat (2004) agreed that pedagogical principles are methods of teaching; teachers employ to teach students skills and knowledge in different areas of studies. Furthermore, they observed that an instrument for evaluating performance of teachers should consist of items on pedagogical principles.

Hypothesis three compared the mean opinions of administrators and technical teachers on appropriate items required on administrative functions of teachers of EIMW. The result shows that there was significant difference between the mean ratings of the two groups of respondents for items on administrative functions. This implies that items on administrative functions should be included in an instrument for evaluating performance of teachers of EIMW in science and technical colleges. The results of hypothesis three are in agreement with works of Wahala (2001) which stated that technical teachers carried out administrative functions such as manage class, instructional materials, keep records, among others.

Hypothesis four compared the mean opinions of administrators, technical teachers and students on appropriate items required for evaluating performance of teachers of EIMW in their psycho-social factors. The result revealed that there was no significant difference in the mean opinions of the three groups of respondents on items on psycho-social factors. This implies that the items on psycho-social factors are appropriate and required, so the items should be used for evaluating performance of teachers of EIMW. Works of Yakubu and Jacob (2004) pointed out some psycho-social factors possessed by teachers such as patience, honesty, respect for others, friendliness, among others. An instrument for evaluating performance of teachers should include items on psycho-social factors. This implied that all the groups of respondents agreed that all items in the format are appropriate and required, so should be used for evaluating performance of teachers of EIMW in science and technical colleges.

Conclusion

Based on the results of the study, the following conclusions are drawn: An instrument for evaluating performance of teachers of EIMW is developed. The developed instrument contained items on EET, pedagogical principles, administrative functions, and psycho-social factors. The instrument is required for evaluating performance of teachers of EIMW in science and technical colleges.

Recommendations

Based on the findings of this study and implications, the followings are hereby recommended for action:

(i) Items in the format should be considered for evaluating performance of teachers of EIMW in science and Technical Colleges.
(ii) The reliable developed instrument should be considered by Management of Board of science and technical as an alternative appraisal form for evaluating performance of teachers of EIMW.
(iii) The items in the developed instrument should serve as a yardstick for evaluating performance of teachers of EIMW by administrators of science and technical Colleges.
(iv) The instrument developed should be used to determine weakness and strength of performance of teachers of EIMW for further advice and recommendations by administrators in Science and Technical Colleges

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INNOVATIVE STRATEGIES FOR ACHIEVING QUALITY ASSURANCE IN THE TEACHING AND LEARNING OF MOTOR VEHICLE MECHANICS WORK IN NIGERIAN TECHNICAL COLLEGES

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Abstract
Motor Vehicle Mechanics Work (MVMW) as a trade subject in Nigerian technical colleges is designed to equip trainees with technical knowledge and skills needed for employment in the automobile workplace. Quality assurance is a mechanism put in place to ensure proper attainment of the goals of Motor Vehicle Mechanics Work as stipulated by the National Policy on Education in 2013. This study through literature review dealt with the concept of Motor Vehicle Mechanics Work as a trade subject, quality as well as quality assurance in Motor Vehicle Mechanics in technical colleges. The study also unveiled the need to achieve high quality assurance in Motor Vehicle Mechanics Work. The paper discussed some of the barriers towards attaining high quality assurance in Motor Vehicle Mechanics Work in Nigerian technical colleges. The paper proposed innovative strategies for achieving quality assurance in the teaching and learning of motor vehicle mechanics work in Nigerian technical colleges. The researchers based on literature evidence reviewed recommended among others: recruitment of only qualified MVMW teachers, provision of standard automobile workshop with functional equipment and tools for effective practical training as well as adequate provision of in-service training and retraining of MVMW teachers to equip them with new technological ideas and instructional methods to achieve high quality assurance system as well as quality graduates in Motor Vehicle Mechanics trade in Nigerian technical colleges.

Keywords: Motor Vehicle Mechanics Work, Learning, Teaching, Quality assurance, Technical Colleges

Introduction

Teaching and learning are two activities that are geared towards the attainment of educational goals. According to Ayeni and Ogunbaru (2013) teaching and learning as a combined term refers to an organized instructional process that is consciously geared towards transforming and developing students' intellectual ability, skills, ethics and values to enable individuals function effectively and become self reliant, at the same time contribute positively to societal development. In the view of Akamobi (2005), teaching was defined as the process of transferring information from the teacher to the learner to facilitate desirable change in behaviour in the learner; while learning is a relatively permanent change in behaviour that occurs in a learner when the learner is expose to some experiences or training.

Teaching is a human undertaking whose aim is to help learners to learn. It is an interactive process between a teacher and a student under the teachers' guide (Abiodun, 1999). Learning on the other hand is a change in behaviour due to experience. Ogundipe (2004) sees learning as a process by which behaviour is initiated, modified or change. From these explanations by various authors, it is obvious that for successfully attainment of the purpose of teaching and learning of Motor Vehicle Mechanics Work as a technical trade subject in Nigerian technical

colleges, innovative strategies for achieving quality assurance must be put in place in technical colleges.

Motor Vehicle Mechanics Work is one of trade subjects offered in Technical Colleges in Nigeria. It is a major component of the Technical and Vocational Education and Training (TVET) programmes in Nigeria. TVET is a type of education whose major objective is to prepare individuals for employment in chosen occupations by equipping them with the vocational skills, knowledge and attitude necessary for employment in recognized occupations. Federal Republic of Nigeria (FRN) (2013) described TVET as a comprehensive term referring to those aspects of the educational process involving, in addition to general education, the study of technologies and related sciences and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupations in various sectors of economic and social life.

TVET is a form of education designed to develop skills, abilities, understanding, attitudes, work habits and appreciation encompassing knowledge and information needed by a person to enter and make progress in self or paid employment on a useful and productive basis. TVET gives individual the skills to live learn and work as productive citizen. It reduces the over dependence of graduates on government for employment. TVET is offered in technical colleges, polytechnics, monotechnics, and colleges of technology among others. Technical colleges are regarded as one of the principal TVET institution in Nigeria for the training of craftsmen (NBTE, 2017). According to FRN (2013), the Motor Vehicle Mechanics Trade aspect includes: Auto body repairs and spray painting, Auto electrical work, Auto mechanical work, Auto parts merchandising as well as Air conditioning and refrigeration.

Motor Vehicle Mechanics' Work (MVMW) as a trade subject according to National Policy on Education (FRN, 2013) is one of the vocational programmes offered at the Technical College level. Motor Vehicle Mechanics trade in technical colleges is designed to equip trainees with technical knowledge and skills needed for employment in the automobile workplace. The policy revealed that technical college is one of the vocational and technical institution saddled with the responsibility of educating and training craftsmen and master craftsmen in various technical trades in Nigeria. Graduates of Motor Vehicle Mechanics' Work course commonly called MVM according to National Board for Technical Education (NBTE, 2017), should among others be able to identify problems, repair and service mechanical, electrical and electronic system and components of cars, buses and trucks.

The philosophy of Motor Vehicle Mechanics' programme according to NBTE (2017) is to produce competent automobile craftsmen for Nigeria's technological and industrial development and to conduct examinations leading to the award of the National Technical Certificate (NTC) and Advanced National Technical Certificate (ANTC) for Motor Vehicle Mechanics' craftsmen and master craftsmen respectively. NBTE also strive to provide facilities and also coordinates activities in technical colleges to enhance student's achievement in MVM. The National Business and Technical Examinations Board (NABTEB) report on poor students' achievement in MVM is a pointer showing that students' interest in MVM is low. Ethel (2013) stated that high interest in a subject enhance high achievement. According to Ethel (2013), the increasing unemployment rate among automobile craftsmen resulting from the inability of MVM graduates to practice their trade could also be attributed to the cumulative effect of the students' low interest toward MVM in technical colleges.

In line with this, Olatunde (2014) attributed the periodic decline in students' interest in mechanical engineering trades at college level to poor motivation of student, inappropriateness

of method of instruction as well as poor quality assurance system in MVM programme in technical colleges in North central Nigeria. Perhaps, developing innovative strategies for achieving quality assurance in the teaching and learning of Motor Vehicle Mechanics Work in Nigerian Technical Colleges could help improve the quality of craftsmen graduating from Motor Vehicle Mechanics programmes, thereby enhancing their employability skills in the labour market as well as preparing them for further education in tertiary technical and technological institutions.

Quality in Motor Vehicle Mechanics Work as a Trade Subject

In recent times, efforts by various educators and scholars to enhance quality in the education system has brought about various definitions as well as descriptions of the word "quality" and "quality assurance". According to World Bank (2017) quality is a desirable attribute of a product or service that distinguishes it for the person seeking the attribute. Viewed from this definition, quality could be said to have the attribute of worth and acceptance. Nevertheless, World Bank (2017) maintained that good quality should posses the characteristics of conformance to expectation, conformance to requirement, excellence and value and loss of avoidance. Asiyai and Oghuvbu (2009) defined quality as a measure of how good or bad the products of higher education institutions in Nigeria are in terms of their academic performance and meeting established standards.

World Organization of Standardization (2014) defined quality as the totality of features and characteristics of a product of services that bear on its ability to satisfy stated needs. Article 11 of the World Declaration on Education (2003) sees quality as a multi-dimensional concept which should encompass all the functions and activities in schools. Such activities of higher educational institutions have been highlighted as teaching, research and scholarship, community service, staffing, students, infrastructures and educational facilities, equipment and the academic environment. High quality delivery is a prerequisite for effective productivity in education industry and hence quality education is an instrument for effecting national development. According to Ekong (2006), quality builds knowledge, live skills, perspectives, attitudes and values. When quality education is delivered high enough to meet set standards, the products of education should be able to perform well in the world of work in real life situation. When quality is low, performance cannot meet the set standards. Hence one can say that the quality of education has declined below set standard.

Quality in Motor Vehicle Mechanics Work as a trade subject in essence entails a functional MVM that can equip all MVM trainees or students with the required vocational and technical skills needed to gain employment in automobile industries, to practice their trade as automobile craftsmen in the automobile workplace. A quality MVM programme should be able to help graduating trainees or craftsmen to solve their professional problems and make them responsible citizens and not a liability to society. Achieving quality MVM programme in Nigerian technical colleges demand a good quality assurance system in the planning and administration of activities in MVM programme in Nigerian technical colleges.

Conceptual Clarification on Quality Assurance in Motor Vehicle Mechanics Work Subject

The term Quality Assurance (QA) is the process of maintaining standards in products and services through inspection or testing of samples (Okebukola, 2010). In another view, Okebukola, (2010) noted that quality assurance is an umbrella concept for a host of activities that are designed to improve the quality of inputs, process and outputs of higher education system. Okebukola contended that quality assurance entails the quality of available instructional

materials for teaching, equipment, facilities, school environment, pupils, curriculum, quality of instructional delivery and quality of teachers. Quality assurance is designed to prove and improve the quality of an institutions methods, educational products and outcomes (Oyebode, Oladipo & Adetome, 2008). Everyone has a role to play in ensuring quality assurance in trade subjects in technical college education system.

One of the key building blocks of quality assurance in education is the development of minimum standards as in qualification of MVM teachers, the quality of teaching in institutions, expected educational achievement of students and the development of a more rigorous management process for education so that the entire sector develop stronger operating policies, procedures which are well documented and adhered to. With time, this will develop into a total management system for technical education in line with what is practiced internationally. Alele – Williams (2004) defined quality assurance in any educational institution as that which indicates the pre-eminence and special features that makes the institution distinct from other forms of institution. The author indicated that educational reforms aimed at providing better quality in education worldwide and based on this, there must be reorganization in order to achieve the stated goal. Tovey (1994) described the quality of education as dealing with issues of relevance, validity, functionalism and efficiency of education system in the achievement of national goals and objectives.

Tovey (1994) examined the nature of quality in education and stated that quality is perceived as the level of achievement or performance and this is linked with the ability to function well in the school environment and to meet the need of the entrepreneur. Oderinde (2004) enumerated two aspects of quality in education, which are both internal and external. The internal aspect is the implementations of the school objectives while the external aspect deals with the implementation of national objectives, which are pre-requisites to the achievement of quality in any educational institution. A systematic and consistent quality assurance system helps to establish an institution's good reputation and image. It includes defined standards of achievement, documented procedures for all identified process, established ways of responding to issues and clear accountability for outcomes. The result is greater public confidence, more satisfied students, efficient processes and staff who are confident in their jobs. Students are more likely to experience better quality instructions, learning materials and interactions with the institution and its staff, leading to enhanced learning outcomes.

The quality of technical college graduates from the various trade areas, according to Uvah (2005) could be measured by how well they have been prepared for life and for service to society in various spheres of human endeavour. It could also mean how useful they are to solving practical problems in industries or the society at large. Quality may also be considered on the basis of how good and efficient the teachers are; how adequate and accessible the facilities and materials needed for effective teaching and learning are; and how prepared the graduates are for meeting the challenges of life and for solving the societal problems. Thus, quality assurance is the guarantee of confidence and certainty by a programme of study given by an institution that standards and quality are being maintained and enhance (Ethel, 2013).

In essence, Quality assurance in technical trade subjects in technical college is a mechanism or system put in place to ensure proper achievement of the goals of technical college education as stimulated by the National Policy on Education in 2013. By this conceptual understanding, it can be said that the emphasis on quality assurance is the training of personnel to enhance their performance in work places. In the technical colleges, the role of ensuring quality assurance in all components or trade subject areas is not a one man business but is bestowed on several

stakeholders such as : National Board for Technical Education (NBTE), State Science and Technical Schools Boards (SSTSB), National Business and Technical Examinations Board (NABTEB), production and service industries, among others.

Scope of Quality Assurance

Middlehurst (2001) describe the scope of quality assurance as including the following dimensions:

(i) Regulation (legal frameworks, governance, responsibilities and accountabilities).
Educational process (admissions, registration or enrolment, curriculum design and delivery, support for leaving and assessment).

(ii) Curriculum design and content (validation and approval frameworks, levels and standards etc).

(iii) Learning experience (consumer protection, students' experience, complaints and appeals).
Outcomes (qualifications, certificates, transcripts, security, transferability, recognition/ currency and value).

In summary, Middlehurst sees quality as a grade of achievement, a standard against which to judge others. In the same vein, Abdulsalami (2002) says quality in higher education is multidimensional and embraces all functions and activities of a university including teaching, academic programmes, research and scholarship, staffing, students, buildings, facilities, equipment, services to the community and the academic environment.

The Need for High quality assurance in Motor Vehicle Mechanics Trade

The high and increasing level of unemployment and poverty among graduates of Motor Vehicle Mechanics Work programme in Nigerian technical colleges calls for an urgent and pressing need to achieve high quality assurance in Motor Vehicle Mechanics trade. It is paramount to achieve high quality assurance in MVM programme so as to meet the national goals of TVET which according to the FRN (2013) are to :

(i) provide trained manpower in the applied sciences, technology and business particularly at craft, advanced craft and technical level;

(ii) provide the technical knowledge and vocational skills necessary for agricultural, commercial and economic development ;

(iii) give training and impart the necessary skills to individuals who shall be self-reliant economically.

Achieving high quality assurance in MVM programme is also needed to enable MVM trainees completing technical college programmes to fulfil the national goals of :

(i) Securing employment either at the end of the whole course or after completing one or more modules of employable skills;

(ii) Set up their own business and become self-employed and be able to employ others;

(iii) Pursuing further education in advance craft/technical programme and in post-secondary (tertiary) technical institution such as Science and Technical colleges, polytechnics, college of technology, colleges of education, monotechnic and universities.

In essence, high quality assurance is needed in MVM programme to equip MVM trainees with the requisite technical skills and knowledge for survival in the world of work so as to become responsible citizens for a better Nigerian society.

Barriers towards Achieving High Quality in Motor Vehicle Mechanics Course in Technical colleges

(i) Poor Societal Attitude Towards MVM programme

This is connected to the poor image of vocational and technical education as perceived by the Nigerian public. People still prefer to go about looking for white jobs as a result of low status associated with vocational education. Some other person sees MVM programme as a dirty occupational trade meant for the dull and less privileged individuals. Some parents want their children to be medical doctors, accountants, lawyers, administrators and politicians because of the negative attitude toward vocational education accounts for the decline and lack of interest by the students in the teaching of education in schools. The teacher then has an uphill task teaching people who are not interested in the subject that is being taught (Omo-Ojugo & Ohiole, 2008).

(ii) Insufficient and Poor State of Training Facilities

The connection between existing facilities the course curriculum and minimum standard is very important and a vital point to consider for quality assurance to be maintained, many institutions running vocational education programmes struggle to have sufficient facilities, thus it is difficult for them to procure necessary equipments for the programme and this results to over utilization of the existing facilities it is important to note that no curriculum can be adequately covered without adequate facilities to work the curriculum out and no talk of standard can be achieved when the curriculum is not adequately covered (Gift & Fiokedu , 2014).

(iii) Insufficient Staff Quality and Quantity

The quality of lecturers/teachers employed in universities and other agencies responsible for the training of vocational education teachers is very crucial. It is obvious that the quality of a teacher in charge of training as one of the indicators of standards in teacher's education. The continuous shortage of vocational experts is a major factor affecting the development and quality of vocational education in Nigeria and other parts of the world (Adeoye, Oluwole & Oyewumi, 2014). As a result of inadequate qualified personnel most of the equipment and machines in some schools are easily abandoned because they lack competent hands to manipulate them. The need for technical manpower in the present stage of development is very important as one strive towards being a self reliant nation it is noted that no meaningful development can take place without a conscious effort to develop manpower in vocational areas. Quality cannot be guaranteed when the quality and quantity of personnel are inadequate to meet the desired expectation (Adeoye, et al, 2014)

(iv) Poor Attitude Towards Staff Capacity Building and Retraining of the Trainers

The socio economic and societal needs today are enormous and varied. New machines and tools are required daily to meet the complex industrial needs of modern times in the area of vocational education. Looking at today's situation the vocational skills being exhibited by teachers/lecturers may not meet the demands of tomorrow for technical progress. Moreover, current skills and bodies of knowledge create a need for retraining of teachers/lecturers. On the job training is very necessary for the success of today's vocational teacher and also a tool for ensuring quality assurance in vocational education (Olaitan, 2007).

(v) Poor Remuneration of Vocational and Technical Teachers

The MVM teacher suffers the same problem of poor remuneration like other vocational and technical teachers in Nigerian technical colleges. This is a serious problem affecting quality in our educational system in most states in Nigeria and other parts of Africa. Salaries, allowance, and entitlements are sometimes paid in arrears or at times they are being denied. This factor has led to brain drain in recent times as professors and some University dons proceed to other

countries in hundreds to search for better conditions of service without replacement (Oni, 2007).

(vi) Poor Administration and Poor Supervision of Vocational Education Programme

Poor administration and supervision of vocational education programme can greatly affect the quality assurance in schools, lack of co-ordination between the various federal and state agencies responsible for the administration of vocational education program has resulted in costly duplication of efforts and inability to design appropriate curricular for the Nigerian youth. According to Puyate (2008), government, administrators, and proprietors do not take internal and external supervision seriously in the institutions.

(ix) Inadequate Funding of Trade Courses in Nigerian Technical Colleges

Inadequate funding is a very serious issue affecting vocational education programme. Inspite of the efforts of the different governments of the federation to provide funds for higher education, and the huge amount of money expended, higher education still lacks fund to implement various programmes. Inadequate financial resources in the higher institutions have the effect of limiting the educational development policy of both state and local governments. Basic infrastructures are lacking in our universities, workshops are not provided for the program in some school. Even where they are available, they are either empty or stocked with obsolete items (Ethel, 2013).

Strategies for Achieving Quality Assurance in Motor Vehicle Mechanics Course in Technical Colleges

(i) Special allowances should be paid to Motor Vehicle Mechanics teachers to boost their morale for high productivity.

(ii) There should be a monitoring team from the State and Federal Ministries of Education to check on-going technical college education programmes for flaws or breakdowns, provision of information to regulate activities and undertake corrective actions.

(iii) Technical college Motor Vehicle Mechanics teachers should be encouraged to attend in-service trainings such as sandwich and part-time training through government sponsorship in Nigeria.

(iv) A strategic implementation framework is also vital to the success of quality assurance efforts. The framework should begin with a quality policy statement for managing and encouraging participatory management technical college education especially in the various trade areas.

(v) Technical college Motor Vehicle Mechanics teachers should be trained in Quality Assurance methods, problem solving technique, and communication techniques. This has been found to be effective in resolving problems such as low staff morale, low student performance, truancy and student failure. Other areas of success include more student involvement, decline in dropouts rate, growth in Parent- Teacher-Association (PTA) membership and greater faculty involvement in professional activities.

(vi) Departmental meetings of theof MVM teachers and automobile industrial stakeholders could be a useful strategy for problem solving and new programme initiatives in technical college education system.

(vii) An implementation committee on enhancing quality among technical college Motor Vehicle Mechanics in the various trade subject areas should be set up and this committee should always be made up of people who are experts in technical college education.

(viii) A built-in evaluation instrument should be constructed as an appendage of implementation committee document for the purpose of periodical evaluation of both the implementation processes and the success or failure of technical college education programme.

(ix) There should be regular inspection of technical college from the vocational and technical education section of the Ministries of Education (Federal and State) in Nigeria. This inspection should focus on technical college accountability process, maintenance of equipment, improving performance and quality of teaching and developing an annual report covering school performance, students' achievement and financial performance.

(x) More Motor Vehicle Mechanics teachers should be trained and employed in Nigeria to be able to cope with the increase in the population of students.

(xi) Efforts should be geared towards the provision of technical equipment in the various trade subject areas necessary for enhancing technical college education programme in Nigeria by the various government, philanthropist, communities, private sectors and organizations.

(xii) Seminars, workshops and conferences should be organized regularly for Motor Vehicle Mechanics teachers in the various trade subject areas to acquaint them with the use of the modern equipment.

Conclusion

Based on the reviewed facts from literature evidence, the need for quality assurance in Motor Vehicle Mechanics Work as a trade subject in Nigerian technical college cannot be over ignored because the current status of the performance indicators of the programme still leave so much to be attended to in answering the numerous questions of quality assurance status of Motor Vehicle Mechanics Trade programmes in Nigerian technical colleges. Since Motor Vehicle Mechanics Work education is paramount in national technological and economic development, all stakeholders and technical institutions should put up serious effort in ensuring high quality in Motor Vehicle Mechanics Work programme in technical colleges. Therefore, there is urgent need for government and the various stakeholders to intensify effort to acquaint themselves with the identified strategies for achieving quality assurance in Motor Vehicle Mechanics Trade in Nigerian Technical Colleges.

Recommendations

Based on the facts from the literature evidence reviewed, the following recommendations were made:

(i) Practical method of teaching Motor Vehicle Mechanics Work should be emphasized so that the youths will acquire basic practical skills and knowledge for self-reliance and general development of the society. MVM teachers should endeavour to prepare adequately for their lessons by employing the use of real or concrete materials as instructional materials.

(ii) Experts in Motor Vehicle Mechanics Work should teach Motor Vehicle Mechanics Work course and headship of MVM department should be strictly restricted to Motor Vehicle Mechanics or automobile professionals.

(iii) The welfare of Motor Vehicle Mechanics Work teachers should be promptly attended to by stakeholders. For example, regular payment of salaries, allowances, promotions and remuneration. Government should increase funding and budgetary allocation to the TVET sector.

(iv) There should be provision for in-service training and retraining of teachers to equip them with new ideas, methods of the value and benefit of vocational education and what role it is expected to play in the nation's technological development.

(v) Adequate and qualified Motor Vehicle Mechanics Work teachers should be regularly recruited and posted to technical colleges to avoid shortage of staff in the departments of vocational education.

(vi) The government should provide modern equipment, works shop machines, for effective implementation of Motor Vehicle Mechanics Work curriculum in technical colleges.

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