

Assessment of Adequacy Facilities and Required Personnel for Implementation of NCE Mathematics Curriculum among Colleges of Education North-Central, Nigeria

ABDULRAHIM, Musbahu¹, Dr. R. W Gimba², Dr. A.A Hassan³, Dr. M. Jiya⁴

¹*Dept of Physics, Niger State College of Education, Minna, Niger State, Nigeria*

^{2,3}*Dept of Science Education, Fedreal University of Technology, Minna, Niger State, Nigeria*

⁴*Dept of Mathematics, Federal University of Technology, Minna, Niger State, Nigeria*

Abstract: - The purpose of the study was to Assess the Nigeria Certificate in Education among Colleges of Education in North-Central, Nigeria. Two research questions with corresponding research hypotheses guided the study. The research adopted a descriptive survey design. The study was conducted in all the thirteen Colleges of Education in North- Central States of Nigeria. The population of this study consisted of 131 Mathematics lecturers and 116 Mathematics lecturers was sampled Data were collected through the use of questionnaire. The instrument has a reliability coefficient of 0.83. The findings showed that Workshops in Colleges of Education in North-Central States of Nigeria were inadequate and the required personnel need to be improved on as they were little challenges on the required personnel. Most of the equipment, tools, and machines available in the colleges were not enough to cater for increasing population of students' enrolment. The study recommended that the Federal and States owned Colleges of Education should be provided with adequate workshops and required facilities to cater for the increasing students' population. This will in turn promote teaching and learning in Nigeria Education sector.

Keywords: Adequacy, Workshop Facilities, personnel

I. INTRODUCTION

Education is the key to achieving and sustaining the goals of any society. Hence it must be adopted as the tool for achieving desired social change that can lead to meaningful growth and development of the nation (Asebiomo, 2015). The quality of life in a society depends significantly on the standard of education (Adegbesan, 2010). Education and schooling could be seen as tools which are used for the development of human potentials that help individuals to attain self-actualization (Richard & Aghenenu, 2016). In Nigeria, education is categorized into three levels namely; Basic, Secondary and Tertiary Education. The place of Mathematics in the realization of the objectives of these three levels of education cannot be overemphasized. However, these could be achieved through adequate teaching and learning of Mathematics.

It is a fact that, Mathematics today is having an enormous impact on science and society (Emmanuel & Daniel, 2016). Thus, Mathematical ideas have helped make possible the revolution in electronics, which has transformed the way we think and live. In other words, Mathematics as a universal part of human culture and is the tool and language of commerce, engineering and other sciences which help us recognize patterns and to understand the world around us. Mathematics plays a vital role in many aspects of modern life, like; space travel, safeguarding credit card details on the internet, stemming the spread of epidemics, predicting stock market prices and business decision making (Emmanuel & Daniel, 2016).

To this end, students need to be encouraged to know the importance of Mathematics in national development as the quality teaching personnel should be employed to teach the subject. The contents to be learnt are well spelt in curriculum.

It is appropriate to say curriculum as all the experience required of a child for all round development since the organization of schooling and further education had long been associated with the idea of curriculum (Ali & Ajibola, 2015). Curriculum is a particular form of specification about the practice of teaching; it is a way of translating any educational idea into hypothesis testable in practice. In Nigeria, secondary school curriculum is designed to encourage all students to achieve their spiritual, intellectual and social potential as well as to understand the relevance of learning in their daily lives (Ali & Ajibola, 2015).

According to Asebiomo (2015), no matter how well a curriculum of any subject is planned, designed and documented, implementation is important. Asebiomo (2015), defined Curriculum implementation as the process of putting all that have been planned as a curriculum document into practice in the classroom through the combined efforts of teachers, learners, school administrators, parents as well as interaction with physical facilities, instructional materials, psychological and social environment. At this juncture, it

could be said that putting the curriculum into operation requires an implementation agent. The teacher is identified as the agent in the curriculum implementation process. Curriculum implementation therefore refers to how the planned or officially designed course of study is translated by the teacher into syllabus, scheme of work and lessons to be delivered to students.

The teacher training institutions that are recommended for training basic school (Primary and Junior Secondary) teachers are the College of Education. The mandate of the teacher training programme at the Nigeria Certificate in Education (NCE) level is to produce quality teachers for the basic education subsector. An academic staff in colleges of education are classified as senior (Chief Lecturer, Principal Lecturer and Senior Lecturer) and junior (Lecturer I, Lecturer II, Lecturer III and Assistant Lecturer) based on professional development. These classifications are based on academic qualification; working experience and number of publications.

The National Commission for Colleges of Education (NCCE) has evolved a comprehensive curriculum process in response to both the changing needs in the Education sector and the statutory periodic reviews to which the minimum standards are subjected to every five years (NCCE, 2012). From 1990 to 2013 five editions of the minimum standard were produced and implemented, the process of producing the 2012 edition of the NCCE minimum standard started in the year 2008 without the involvement to any significant level of either College of Education lecturers or the beneficiaries of the training.

There is need for well-equipped workshops with adequate facilities to provide the required

training and impart the necessary skills leading to the production of skilled personnel who will be enterprising and self-reliant. The NCCE minimum standard (2012) stated that another important aspect for training of competent teacher is the provision of office facilities; this is because the comfort of staff and provision of relevant facilities such as computers, printers, photocopiers makes teaching and learning effective. The Provision of these facilities play pivotal role in the actualization of the educational goals and objectives. The facilities in schools are material resources that enhance teaching and learning thereby making the process meaningful and purposeful. Mbaga, Sambo and Tijjani (2018) pointed out the availability of equipment and facilities aid memory by making abstract concepts concrete. Equipment and facilities make it possible for the students to interact with the learning materials (Mbaga, Sambo & Tijjani, 2018).

Statement of Research Problem

The Federal Republic in Nigeria (FRN, 2004) in its National Policy on Education affirmed under "the Philosophy of Nigeria education that educational and training facilities will be multiplied and made more accessible, to afford the individual a far more efficient and flexible choice. In most of

our colleges of education today, there are no enough equipment and materials neither for teachers to conduct practical activities nor for students to carry out investigative activities or practical work on their own in order to discover things and improve their practical skills. Adequacy of Workshop and training facilities cover wide variety of issues such as programmes, facilities, workshop, environment, storage facilities, lighting, ventilation, and machines. This must be provided because functional facilities enhance quality learning.

Aim and Objectives of the Study

Assessment of Nigeria Certificate in Education Mathematics curriculum implementation among Colleges of Education North-Central, Nigeria. The objectives of the study are as follows:-

1. To determine if the required facilities to run the NCE Mathematics programme are adequate.
2. To determine if the required personnel to run an NCE Mathematics programme are adequate.

Research Questions

The following research questions would be pursued in this study.

1. What are NCE Mathematics lecturers' assessments about the availability and adequacy of required facilities to run an NCE Mathematics programme?
2. What are NCE Mathematics lecturers' assessments about the quality and required personnel to run an NCE Mathematics programme?

Null Hypotheses

The following null hypotheses was formulated and tested at 0.05 level of significance guided the study:

HO₁: There is no significant difference between the assessment of less experienced and experienced NCE Mathematics lecturers about the availability and adequacy of required facilities to run an NCE Mathematics programme.

HO₂: There is no significant difference between the assessment of less experienced and experienced NCE Mathematics lecturers about the quality and required personnel to run an NCE Mathematics programme.

II. RESEARCH METHODOLOGY

The researcher adopted a descriptive cross-sectional survey design. The cross-sectional survey design allows for data to be collected from uniform subjects at different places within a uniform time (Burden & Bayliss, 2008) from 2016 - 2018. This is considered appropriate for this study in order to obtain information about the implementation of Mathematics curriculum in Colleges of Education.

Population of the Study

The population of this study comprised of one hundred and sixty-six (166) Mathematics lecturers' in Colleges of Education in North-Central, Nigeria. Forty five (45) Mathematics lecturers' were from Federal Colleges of Education while one hundred and twenty-one (121) Mathematics lecturers' were from State Colleges of Education in North – Central, Nigeria. There are thirteen (13) colleges of education in North Central, Nigeria, out of which three (3) are Federal Colleges of Education and ten (10) are State Colleges of Education in the North-central states of Nigeria.

Sample and Sampling Techniques

Twelve (12) of the Colleges of Education in North- Central State were used in the study and convenient sampling technique were used on lecturers as the number can be control (Charles, 2009) which consist of one hundred and sixteen (116) Mathematics Lecturers in the Colleges of Education, constituting 100% of the total population of the Mathematics lecturers in the study area as their number can be controlled.

Research Instruments

The research instruments used for data collection was a structured questionnaire adapted from Dambatta (2013), designed for Mathematics lecturers named as Mathematics Lecturers Assessments Curriculum Implementation Questionnaire (MLACIQ).

The research instrument was administered to all Colleges of Education Mathematics lecturers' in North-Central, Nigeria. The lecturers' questionnaire will be divided into two (2) sections. Section A is concerned with the demographic data of the respondents. Section B is structured in four points rating scale: Strongly Agree (SA) = 4, Agree (A) = 3, Disagree (D) = 2 and Strongly Disagree (SD) = 1. The information would be drawn from National Commission for Colleges of Education (NCCE, 2012) minimum standard. Specifically, such information as list of recommended facilities, equipment and materials assessment techniques was drawn from it.

A modified four points rating scale with the numerical value 4, 3, 2 and 1 assigned to the points was employed in seeking answers to the Availability of Facilities for an NCE Mathematics Programme, Availability of Human Resources for an NCE Mathematics Programme.

Validity of the Research Instrument

The instruments for data collection was subjected to face and content validation by experts in Mathematics Education, curriculum lecturers as well as senior lecturers in Science Education department, at Federal University of Technology,

Minna, Niger state college of Education, Minna and Federal college of Education, Kontagora, validated the instruments.

Reliability of the Instruments

All the fifteen (15) Mathematics lecturers in the department were used as sample for the pilot study. The questionnaire was administered by the researcher and data obtained were computed using the Cronbach alpha reliability index. The computed reliability coefficient was found to be 0.83. This met the satisfactory value for judging the internal consistency reliability using the threshold ≥ 0.7 (Glien&Glien, 2003; Hair *et al.*, 2009). The reliability shows the appropriateness of the measurement instruments.

Method of Data Collection

The sampled colleges of education were visited prior to the commencement of the field work to seek for permission from the colleges of education authorities and a staff in the department was selected and used as research assistant from each of the seven colleges of education in the North-central zone of Nigeria. The questionnaire was then administered on the respondents by the research assistant after the interactive session. The mode of administration of the questionnaire was face- to- face on the spot. A total of 116 questionnaire copies were distributed on selected COE Mathematics lecturers from the 7 colleges of education used for the study. 116 questionnaires were retrieved representing 73% and were correctly filled and used for data collation and analysis.

Method of Data Analysis

The data collected from the administration of questionnaire on the respondents were analyzed using descriptive and inferential statistics. Descriptive statistics such as the Mean Rank, Standard Deviation was employed to answer the two research questions. The grand mean rank of 2.50 and above was considered as decision point. While Mann-Whitney U-test statistics was used to test the null hypotheses using computer application package, "Statistical Package for Social Sciences" (SPSS) version 23.0.[]

III. RESULTS AND DISCUSSION

Research Question One

What is the difference in the Mean Rank between less experienced and experienced NCE Mathematics lecturers' assessments about the availability and adequacy of required facilities to run an NCE Mathematics programme?

In order to answer research question 1, mean rank and standard deviation of respondents was calculated and presented in Table 1

Table 1: Mean and Standard Deviation of NCE Mathematics Lecturers' Assessments about the Availability and Adequacy of required Facilities to run an NCE Mathematics Programme

S/N	Items Statement	Mean Rank	SD	Remarks
1	There is adequate office for individual Mathematics lecturer in my college	2.34	.81	Disagree
2	The offices are equipped with bulletin board	1.96	.67	Disagree
3	There are book shelves in each office in my college	2.09	.81	Disagree
4	There are visitor's seat in each office in my college	2.65	.83	Agree
5	The offices are furnished with standard furniture	2.18	.82	Disagree
6	There is H.O.D of Mathematics office in my college	3.47	.67	Agree
7	The H.O.D of Mathematics office has file cabinet	3.25	.73	Agree
8	The H.O.D of Mathematics office has an office for thetypist and clerk	2.33	.90	Disagree
9	There is at least a Mathematics workshop in my college	2.54	.74	Agree
10	The resources in the Mathematics workshop in my college is adequate	2.26	.77	Disagree
11	There is at least three (3) lecture rooms and a lecture theatre in Mathematics department in my college	2.38	.89	Disagree
12	The Mathematics department in my college has a departmental library	2.36	.83	Disagree
13	The departmental library in my college has adequate number of current and relevant Mathematics text books, at least in the ratio of one student to ten books as stipulated in the NCCE minimum standard	2.11	.70	Disagree
	Grand Mean and Standard Deviation	2.46	.78	.78

Table 1 Presents the NCE Mathematics less experienced and experienced lecturers' assessments about the availability and adequacy of required facilities to run the NCE Mathematics programme. It was observed that majority of the respondents Disagreed with the availability and adequacy of required facilities to run the NCE Mathematics programme, while few Agreed with the availability and adequacy of the required facilities to run the NCE Mathematics programme. This is because the grand mean rank 2.46 was less than the decision mean rank 2.50.

Research Question Two

What is the difference in the Mean Rank between less experienced and experienced NCE Mathematics lecturers' assessments about the quality and required personnel to run an NCE Mathematics programme?

In order to answer research question 4, mean rank and standard deviation of respondent was carried out and presented in Table 2

Table 2: Mean and Standard Deviation of NCE Mathematics Lecturers' Assessments about the Quality and required Personnel to run an NCE Mathematics Programme

S/N	Items Statement	Mean Rank	SD	Remarks
14	The Mathematics in my college has at least eight (8) academic staff as enshrined in the NCCE minimum standard	2.77	.96	Agree
15	Mathematics lecturers in my college attended at least a conference, a seminar or a workshop that relates to Mathematics contents or Mathematics teaching within the last three (3) years	3.04	.73	Agree
16	The department has at least one computer operator in my college	2.50	.91	Agree
17	The department has at least one library assistant/attendant in my college	2.10	.77	Disagree
18	The department has at least one laboratory assistant in my college	2.29	.76	Disagree
19	The department has at least one typist/secretary in my college	2.40	.82	Disagree
20	The department has at least one office assistant in my college	2.42	.86	Disagree
	Grand Mean and Standard Deviation	2.50	.83	Agree

Table 2 Presents NCE Mathematics less experienced and experienced lecturers' assessment about the quality and required personnel to run an NCE Mathematics programme. It was observed that majority of the respondents are in Agreement with the quality and required personnel to run the NCE

Mathematics programme, while some of the respondents are in Disagreement with the quality and required personnel to run NCE Mathematics programme. This is because the grand mean rank 2.50 is equal to the decision mean rank 2.50.

Testing of Null Hypothesis

HO₁: There is no significant difference between the assessment of less experienced and experienced NCE Mathematics

lecturers about the availability and adequacy of required facilities to run an NCE Mathematics programme.

Table 3: Summary of Mann-Whitney U-test of Less Experienced and Experienced NCE Mathematics Lecturers' about the Availability and Adequacy of required Facilities to run an NCE Mathematics Programme

Lecturer	N	Mean Rank	SD	df	U-value	p-value
Less Experience	49	62.41	4.15	114	1450.0	0.28
Experience	67	55.64	4.31			

Table 3 revealed the Mean Rank of 62.41 and Standard Deviation of 4.15 for less experienced and Mean Rank of 55.64 and standard deviation of 4.31 for experienced with Mann-Whitney U-test 1450.00, df= 114, p>0.05. Since p>0.05, HO₃ was retained. Therefore, there was no significant difference between the assessments of less experienced and experienced

NCE Mathematics lecturers about the availability and adequacy of required facilities to run an NCE Mathematics programme.

HO₂: There is no significant difference between the assessment of less experienced and experienced NCE Mathematics lecturers about the quality and required personnel to run an NCE Mathematics programme.

Table 4: Summary of Mann-Whitney U-test of Less Experienced and Experienced NCE Mathematics Lecturers' about the Quality and required Personnel to run an NCE Mathematics Programme

Lecturer	N	Mean Rank	SD	df	U-value	p-value
Less Experience	49	63.54	5.87	114	1394.5	1394.5
Experience	67	54.81	5.87			

Table 4 revealed the Mean Rank of 63.54 and Standard Deviation of 5.87 for less experienced and Mean Rank of 54.81 and standard deviation of 5.46 for experienced with Mann-Whitney U-test 1394.50, df= 114, p>0.05. Since p>0.05, HO₄ was retained. Therefore, there was no significant difference between the assessments of less experienced and experienced NCE Mathematics lecturers about the quality and required personnel to run an NCE Mathematics programme.

the important of having conducive learning environment particularly as it applies to colleges of education, implies presence and or availability of sufficient facilities such as lecturer hall, workshop equipment and consumables, these provisions and services is a necessity to good quality of teaching and learning. Tom lawyer (2014) has also confirmed that libraries, Mathematics lab in colleges of education are not adequate for student and those they are virtually empty. In addition, the study assessed NCE Mathematics lecturers about the objectives and philosophy of Mathematics programme, the availability of facilities for an NCE Mathematics programme, availability of required personnel for an NCE Mathematics programme and the implementation of the curriculum

Summary of the Findings

There was no significant difference between the assessment of less experienced and experienced NCE Mathematics lecturers about the availability and adequacy of required facilities to run an NCE Mathematics programme.

There was significant difference in NCE Mathematics lecturers about the suitability and adequacy of the philosophy and objectives of the NCE Mathematics programme. The high mean response recorded on the assessed lecturers about the suitability and adequacy of the objectives supported by Bello, (2010) whose study also revealed a significant difference in the assessment of the course objectives and contents by qualified and unqualified lecturers in integrated science.

There was no significant difference between the assessment of less experienced and experienced NCE Mathematics lecturers about the quality and required personnel to run an NCE Mathematics programme.

Discussions of the Results

The assessment of NCE Mathematics lecturers about the availability and adequacy of required facilities to run the NCE Mathematics programme was examined by using research question 1. The study revealed that there was scarcity of curricular and instructional material in most of Mathematics department in schools. This is in line with the Eraikhnen and Oteze (2010) who suggested among others that there should be provision of adequate facilities as they were inadequate facilities recorded in NCE programme. Tahir, (2013) justifies

Null Hypothesis one revealed that there was no significant difference in assessment of NCE Mathematics lecturers about the availability and adequacy of required facilities to run an NCE Mathematics programme. Mohammed, (2012) established the fact that the libraries in most colleges of education in the North-Central states of Nigeria lack sufficient relevant and current journals and text books. Hence, could lead to poor

performance of students in colleges of education. Abdulkarim, (2012) revealed in his finding on the implementation of Business Education curriculum that the equipment in our institutions should be cared for and maintained. But, Eraikhnemen and Oteze (2010) revealed a significant relationship between structural facilities and evaluation of the implementation of the NTI/NCE Mathematics curriculum by distance learning.

Null Hypothesis two revealed that there was no significant difference in assessment of NCE Mathematics lecturers about the quality and required personnel to run the NCE Mathematics programme. This was also in line with the research evidence conducted by Eraikhnemen and Oteze (2010) on the evaluation of the National Teachers Institutes NTI/NCE by NCE Distance Learning System (NTI/DLS) Mathematics programme. The finding revealed the Mathematics programme has adequate number of qualified tutors.

The findings is in agreement with the view of (Owoeye and Yara, 2011) who posited that, the Facilities and equipment constitute a strategic factor in organizational functioning and determine to a very large extent the smooth functioning of any social organization or system including education. He further stated that availability and adequacy of instructional facilities promote effective teaching and learning activities in schools while their inadequacy or unavailability may affect the academic performance of the learner negatively

Implications

This study suggests the need for the federal and state ministries of education to step up efforts to see that some of the problems facing the implementation of the national curriculum for NCE Mathematics in North-Central are reduced, so that the achievement of the students in Mathematics is increased. This demands that the ministries of education in seeing that the NCE Mathematics curriculum is implemented do not only bother about the availability and adequate required facilities but also the human resource management practices like the lecturers' conditions of services.

The fact that the philosophy and objectives of the NCE Mathematics programme have only been achieved to a moderate extent suggests that better results could be achieved if the lecturers' welfare practices are looked into, since lecturers are the final implementers of the curriculum. If the human resource management practices in the colleges of education system are taken care of, the lecturers are likely to utilize fully and very often the available instructional materials.

The fact that the topical contents of the Mathematics curriculum are seen to be capable of achieving the philosophy and objectives of the NCE Mathematics curriculum for colleges of education, suggests that the curriculum could be reviewed regularly to meet the needs of the society. A review of the curriculum may also demand a look at the teaching equipment, materials, and other teaching support facilities for teaching the content of the curriculum.

The fact that the moderate number and quality of Mathematics lecturers were available in colleges for implementing the NCE Mathematics curriculum demands that teaching staff development incentives could be further activated to motivate more would-be-lecturers to take interest in Mathematics teaching, and those already serving to devote more energy and interest in teaching the subject. It is when enough interest is in the job, and the lecturers already in field are also sent on seminars, workshops, conferences that they can comply effectively with the recommended teaching methods and evaluation techniques. This could make the lecturers to bring their qualification and experience to bear in implementation of the NCE Mathematics curriculum.

IV. CONCLUSIONS

NCE Mathematics lecturers indicated that they were few/or non-adequate required facilities to run NCE Mathematics programme. NCE Mathematics lecturers comply positively in the required personnel to run the NCE Mathematics programme.

V. RECOMMENDATIONS

Shortages of relevant material resources in the library of the Mathematics departments were found to be the major factors influencing the implementation of mathematics curriculum. Therefore, federal ministry of education and state ministry of education need to supervise the activities of these colleges in general and availability of material resources in particular.

REFERENCE

- [1]. Abdulkarim A. A. (2012). Evaluation of the implementation Business education curriculum. *Minna Journal of Educational Studies* (MIJES). 5(1), 105-110.
- [2]. Adegbesan, S.O (2010). Establishing quality assurance in Nigerian education system: Implication for educational manager. *Educational research and Reviews*, vol. 6(2), 147-151
- [3]. Ali, A. A. & Ajibola A. L. (2015). Issues and prospects of effective implementation of new secondary school curriculum in Nigeria. *Journal of Education and Practice*. 6(34),
- [4]. Asebiomo, A. M. (2015). Moving with global trends in curriculum innovation: mitigating the challenges of curriculum implementation for effective teaching and learning in Nigeria. *International Journal of Managerial Studies and Research*, 3(1), 26-33
- [5]. Burden, R. & Bayliss, P. (2008). A survey into mainstream teachers' attitudes towards the inclusion of children with special educational needs in the ordinary school in one local education authority. *Journal of Educational Psychology*, 20 (2): 191 – 215.
- [6]. Glien, J. A. & Glien, R. R. (2003). Calculating, interpreting and reporting Cronbach's alpha reliability coefficient for Likert-type scales. In *proceedings of the Midwest research to practice conference in Adult, Community Education*, (pp. 82-88), Ohio State University, Columbus, Ohio, USA, Retrieved from <http://s3.spangfish.com/s/8287/documents/psychological%20measurement/cronbach%20alpha.pdf>
- [7]. Mbag, E. V; Sambo, M. M & Tijjani, A. (2018). Adequacy of workshop facilities in colleges of education (technical) for training of trade teachers of technical colleges in north eastern states of nigeria. *International Journal of Vocational and Technical Education Research*. 4(1), 42-49
- [8]. Mohammed, J. (2012). Level of the equipment for English Language libraries and the implementation of the English Language programme at colleges of education in North Central

- States of Nigeria. *Academic Journal of Management Sciences*. 1 (1), 38-40.
- [9]. Owoeye, J. S. & Yara, P. O. (2011). School facilities and students' academic achievement of secondary of secondary school agricultural science in Ekiti state, Nigeria. *Asian Social Science*, 7(7), 64-74.
- [10]. Richard J. & Aghanenu E. O. (2016). Effect of gender and subject combination on the achievement of NCE Mathematics students in colleges of education in Delta State. *International Journal of Research*, 3(12), 1011-1019
- [11]. Emmanuel, D. E & Daniel, O. B. (2016). Challenges and prospects of mathematics education in Nigeria. Unpublished (PhD) thesis.
- [12]. Eraikhuemen, L. & Oteze, I. K. (2010). An evaluation of the mathematics education component of the Nigeria Certificate in Education programme of the NTI http://www.saide.org.za/resources/Conf%202010/Eraikhuemen_and_Oteze_An_evaluation_of_the_Mathematics_Education_component_...pdf
- [13]. National Commission for Colleges of Education, (2012). Minimum standards for NCE teachers. Abuja. National Commission for Colleges of Education. Ralph Shodeinde Street Garki Abuja.
- [14]. Federal Republic of Nigeria (2012). National Commission for Colleges of Education: Nigeria Certificate in Education Minimum Standard for Sciences. Abuja: NCCE.
- [15]. Tom-Lawyer, O. O. (2014). An appraisal of the revised Nigeria Certificate in Education minimum standard. *EropeanScientific Journal*, 5(12), 165-171.