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ROLE OF COMPUTER-BASED INSTRUCTIONAL STRATEGIES IN CLASSROOM INSTRUCTION IN AN ERA OF DWINDLING ECONOMY

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Abstract
This paper reviews the role of Computer-Based Instructional Strategies in Classroom Instruction in an Era of Dwindling Economy. It explained the concept of Information and Communication Technology (ICT) and its role in classroom instruction in an era of dwindling economy. It also discussed the meaning and types of Computer-Based Instructional Strategies in Classroom Instruction as well as the meaning, types, importance, merits and demerits of Computer Assisted Instruction (CAI) in Classroom Instruction. In addition, the role of Computer-Based Instructional Strategy in classroom in an era of dwindling economy was discussed.

Key Word: Classroom, Communication, Computer, Dwindling, Economy, ICT and Strategies

Introduction

The use of Information and Communication Technology (ICT) has become an integral part of education globally. This is because, ICT enhances the ability of each learner to be able to generate, access, adopt and apply knowledge and information to solve a complex learning problem (Ajayi, 2001). Information Communication Technology (ICT) is seen as a major tool that have a revolutionary impact on how we see the whole world and how we live in it. Therefore, developing countries like Nigeria need to borrow a leaf from the developed ones like United States and adopt the current global trend in the use of ICT for instruction particularly at University level so as to stop producing "analogue graduates" who cannot fit into the practice of modern technology. On teacher education, Kareem (2003) asserted that ICT facilities could enable teachers assume role of guidance and counsellors in assisting students in acquiring the necessary skills and utilizing them in various form for national development. One of the ways the ICT facilities could be used to achieve the above objective is in form of Computer Assisted Instruction (CAI).
Computer Assisted Instruction (CAI) is an interactive instructional technique whereby a computer is used to present the instructional material and monitor the learning that takes place. Computer Assisted Instruction (CAI) has been found to enhance students' performance than the conventional instructional method (Karper, Robinson, & Casado-Kehoe, 2005). Ifeakor (2005) also reported that Computer Assisted Instructional Package had a significant effect on students' cognitive achievement in Chemistry. Computer Assisted Instructional Package is reported to be more effective when used on students in a cooperative setting than on individualized setting (Mudasiru & Adedeji, 2010). Okoye (2012) also reported that students taught using CAI performed significantly better than those taught conventionally. Haluk (2008) examined the effects of CAI on chemistry students understanding of the concept of chemical boding and reported an improvement in their level of understanding of the concept when CAI was used as an instructional strategy. Mills (2001) revealed that CAI was found to be very effective as classroom instructional strategy and improves students' learning outcome significantly. Ifeakor (2005) on the other hand examined the effects of commercially produced CAI on secondary school students' achievement in chemistry and her result revealed a significant improvement on their achievement and interest in chemistry. Also, Tabassum (2004) investigated the effects of CAI on science students' academic achievement and reported an improvement in their performance (achievement).

Okoye (2012) worked on "Computer-Aided Instruction and Achievement in Physics" using a total of 100 students of Lagos state College of Education. The result of his study indicated that, the experimental group students taught using CAI performed better than the control group. Olikeze (1999) worked on the "Effect of Computer Assisted Instruction (CAI) on secondary school students' cognitive achievement and interest in Biology" using a total of 154 students drew from Onitsha Education Zone of Anambra State. The report revealed that the performance of the experimental group was improved significantly over that

of the control group that was taught without CAI. Ramatu (2014) examined the effects of Computer Assisted Instruction on science students' achievement and retention and reported that the experimental group students performed significantly better than the control group. Similarly, college students taught statistics using lecture-plus-CAI obtained higher averages on midterm and final exams than students taught using lecture method only (Basturk, 2005). Chien-hsun (2006) also conducted a study on the effects of Computer Assisted Concept Mapping on learning of social studies and reported a high performance of the experimental group students than their control group counterparts. Students taught using traditional instruction combined with the use of computer performed significantly better than students taught using traditional instruction in a college setting (Akour, 2006). Based on several studies on the use of CAI as an instructional strategy, CAI has been reported to be more effective than the traditional instruction (Mudasiru & Adedeji, 2010).

However, researchers have shown that more studies need to be conducted on the use of Computer Assisted Instructional package in Nigerian education system. This will help broaden the existing indigenous literature on the use of CAI as an effective classroom instructional strategy. In conclusion, the use of Computer Assisted Instructional package for classroom instruction will play a pivotal role most especially in the era of dwindling economy.

Objectives

The specific objectives of this paper are:

1. to explain the concept of Information and Communication Technology (ICT) and its role in classroom instruction
2. to discuss on the meaning and types of Computer-Based Instructional Strategies in Classroom Instruction
3. to discuss on the meaning, types, importance, merits and demerits of Computer Assisted Instruction (CAI) in Classroom Instruction
4. to discuss the role of Computer-based Instructional Strategy in classroom in an era of dwindling economy

Information and Communication Technology (ICT)

Information and Communication Technology (ICT) can be referred to as a computer based instrument used for processing the information and communication strategies of an organization. It consist of computer hardware and software, the internet and many other devices such as audio, video, camera, photography etc that converts information, sound, motion and images into common digital forms (Yusuf & Onasanya, 2004). On the other hand, it involves an electronic application of the process of computing information in form of communication, telecommunication and satellite technology (Yusuf, 2005). Rahman (2002) refers to Information Technology (IT) as component of Information and Communication Technology (ICT) which is used for creating, processing, storing, retrieving and transmitting data and information. This process includes telecommunication, satellite technologies, electrical and electronic computation which allows the users to communicate and manipulate information electronically.

In classroom situation, Information and Communication Technology (ICT) can be referred to as a computer based instrument used for planning a lesson and all the strategies of delivering or imparting the planned lesson to the students as well as assessing the students. ICT can help improve students' understanding of the topic which may be too difficult or too abstract to them. It can be used by teachers to teach effectively some topical areas which might be too slow, too fast, too dangerous or too expensive to teach in the school laboratories (Sani, 2011). Three major roles played by ICT as spelt out in Nigerian curriculum are; learning about ICT, learning with ICT and learning through ICT (Sani, 2011)

i. **Learning about ICT:** This is when ICT becomes the subject or an area of study for the learners. In this case, the learners' study is mainly centered on the composition, structure and functions of ICT.
ii. **Learning with ICT:** This is concerned with the use of ICT as a medium of facilitating classroom instruction irrespective of course of study or topical area.
iii. **Learning through ICT:** This is concerned with the integration of ICT as an essential tool or component of a course of study such that teaching and learning of that course without the use of ICT becomes relatively ineffective or impossible.

Liverpool (2002) classified ICT on the basis of its functions (role in classroom instruction) into four (4) They are; ICT as a subject, as an assisting or aiding tool, as a medium of instruction and as a tool for organization and management of schools.

a. **ICT as a subject:** This is when ICT is seen as a field or course of study and organized in a specific field or course such as "Computer education." The learners in this case are exposed to the component, structure and functions of computer with the major aim of becoming computer literates.

b. **ICT as an assisting or aiding tool:** This is when ICT is used as a tool for conducting research, carrying out an assignment, data collection, data analysis, documentation, communication etc.

c. **ICT as a medium of instruction:** This is when ICT is used by the teachers as an instructional strategy for meaningful teaching and learning to take place. it can be used as computer assisted instruction (CAI) in form of simulation, tutorials, drills and practice etc.

d. **ICT as a tool for school organization and management:** This is when ICT is used in organizing and keeping the school records such as; staff and students personal records, examination records, record of school fees, communication etc.

Roles of ICT as an aid to teachers during Classroom Instruction

Shehu (2006) and Sani (2011) highlighted the roles of ICT to teachers during classroom as follows:

i. Teachers can use Information and Communication Technology in form of Computer-Based Instruction (CBI) software as an aid to interact with a group or a large number of students at a time. This will minimize the problem of teachers' scarcity in certain areas of specialization.

ii. It saves time and increases teacher's efficiency and productivity. It can also enable the teachers to self evaluate themselves and remain updated with the current trends in educational sector.

iii. It enables the students to study independently and at their individual ability levels and pace.

iv. It increases students' easiest means of accessing the updated, dynamic, factual and broader educational information and educational opportunities.

v. It makes teaching and learning more qualitative, faster, cheaper and accessible for all the stakeholders in educational sector.

Computer-Based Education (CBE)

Use of computer as an instructional strategy in education is named in many different ways such as Computer Assisted Instruction (CAI), Computer Aided Instruction (CAI), Computer Assisted Learning (CAL), Computer Based Education (CBE), Computer Based Instruction (CBI), Computer Enriched Instruction (CEI), Computer Managed Instruction (CMI) etc. With the discovery of internet facilities, they are also named as Web Based Training (WBT), Web Based Learning (WBL), and Web Based Instruction (WBI) amongst others.

Computer-Based Education (CBE) and Computer-Based Instruction (CBI) are the commonest terms used for describing Computer manipulated or oriented instructional strategies. This instructional strategy refers to virtually any kind of educational strategies or educational settings that involves the use of computer. On the other hand, Computer Assisted Instruction (CAI) and Computer Aided Instruction (CAI) are also used but in a narrower term. Computer Assisted Instruction (CAI) and Computer Aided Instruction (CAI) are most used inform of drill-and-practice, tutorial, or simulation activities. Computer Managed Instruction (CMI) is an instructional strategy whereby the computer is used to provide learning objectives, learning resources, record keeping, progress tracking, and assessment of learner performance. Computer based tools and applications are used to assist the teacher or school administrator in the management of the learner and instructional process.

Computer Assisted Instruction (CAI)

This simply referred to as a self-learning technique, usually offline/online, involving interaction of the students with programmed instructional materials. By implication, CAI is an interactive instructional technique whereby a computer is used to present the instructional material and monitor the learning that takes place (Egunjobi, 2002). Computer Assisted Instruction is also refers to instruction or remediation presented on a computer. CAI therefore, refers to the use of the computer as a tool to facilitate and improve instruction.

Ways Computer Assisted Instruction could be used for Classroom Instruction

Computer Assisted Instruction (CAI) can be used in classroom for effective instruction in many ways. Some of the ways includes;

1. **Drill-and-practice:** Drill and practice provide opportunities for students to repeatedly practice the skills that have previously been presented and that further practice is necessary for mastery.
2. **Discovery:** Discovery approach provides a large database of information specific to a course or content area and challenges the learner to analyze, compare, infer and evaluate based on their explorations of the data.
3. **Games:** Game software often creates a contest to achieve the highest score and either beat others or beat the computer.
4. **Problem Solving:** This approach helps children develop specific problem solving skills and strategies.
5. **Simulation:** Simulation software can provide an approximation of reality that does not require the expense of real life or its risks.
6. **Tutorial:** Tutorial activity includes both the presentation of information and its extension into different forms of work, including drill and practice, games and simulation.

Uses of Computer Assisted Instruction (CAI) in Classroom Instruction

Teachers should review the developed computer program to understand the context of the lessons, determine which part of the program can lead to meaningful learning and can satisfy the needs of their students and how they may enhance instruction to be students-centered. They may use the following questions as guide while reviewing:

Can this program supplement the lesson, give basic skills practice, or be used as an educational reward for students?

Is the material presented so that students will remain interested yet not lose valuable instruction time trying to figure out how to operate the program?

Does the program waste time with too much animation?

Is the program at the correct level for the class or the individual student?

Does this program do what the teacher wants it to do (help students understand the taught concept, organize the learned concept and reproduce the learned concept)?

CAI programs are interactive and can illustrate a concept through attractive animation, sound, and demonstration. They allow students to progress at their own pace and work individually or solve problems in a group. CAI provides immediate feedback, letting students know whether their answer is correct or not. If the answer is not correct, the program instructs them to revisit the learning process or shows them how to answer the question correctly. CAI encourages the use of different type of learning activities and also encourages changes of the instructional strategy from teacher-led or group instructional strategy to student-led or individual instructional strategy. CAI improves instruction for students with disabilities because they can receive immediate feedback and do not continue to practice the wrong skills. CAI captures the students' attention because the programs are interactive and engage the students' spirit of competitiveness to increase their scores. In addition, CAI moves at the students' pace and usually does not allow them to move ahead until they have mastered the particular learning skill. CAI also provides different lessons to the challenged students like slow learners, the averaged students and gifted students so that they can learn at their different pace. CAI programs involves the use of tutorials, drill and practice, simulation, and problem solving approaches to present the learning topics and provides opportunities to test the students' level of understanding of the topic learnt. CAI also uses a combination of text, graphics, sound and video in enhancing the learning process.

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CAI serves many purposes in the classroom instruction, and it can be utilized to help a student meaningfully learn and understand all areas of the curriculum. Reading CAI programs demonstrate concepts, instruct, and remediate students' errors and misunderstandings from preschool through University. Some CAI programs help students learn basic sign word and phonics skills; others develop and enhance reading comprehension skills through increased fluency, word prediction, and story prediction. CAI may be used individually or in groups in a cooperative learning environment where students can discuss concept as they learn them.

Roles of CAI in Classroom Instruction

Computer Assisted Instruction can be used in the following ways by teachers during classroom to achieve the educational goals as stated in the curriculum:

1. It can be used for one-to-one interaction by the students during learning
2. It can be used to motivates students greatly towards learning
3. It can give students freedom to carry out series experiments with different options
4. It provides instantaneous response /immediate feedback to the students' questions
5. Self pacing - allow students to proceed at their own pace
6. It enable teacher devote more time to individual students especially the slow learners
7. It provides the shy and slow learning students the opportunities to learn faster and meaningfully
8. It provide the teachers the opportunity to always give the students an individual attention
9. It can be used by students to learn more and more rapidly
10. It can be used to help students understand difficult concepts through multi sensory approach
11. Self directed learning - students can decide when, where, and what to learn.
12. New ideas and concepts that might otherwise be excluded from the curriculum or are presently dealt with rather unsatisfactorily can be explored by the students and the teacher.
13. It offers equal educational opportunities for all by using same set of programme for all schools
14. It removes fright, anxiety and embarrassment from the students thus they can ask questions any time the need arises
15. Teachers can be freed to attend to activities as they only serve as advisers or guide to the students during instruction.

Demerits of CAI in Classroom Instruction

Some of the disadvantages of CAI as summarized by Okoye (2012) include;

1. CAI is a patient or silent tutor
2. CAI is an individualized and self-paced instructional strategy
3. CAI material could be too costly to buy for most of our schools and institutions
4. CAI requires special training of the teachers that are to make use of it or special personnel must be employed for its operation
5. CAI requires electricity to be used during instruction, power failure during instruction will disrupt the use of CAI and also, use of CAI in schools located in areas without electricity will be hampered
6. Computer is fragile and requires special handling, this cannot be assured couple with fact that students' academic ability differs
7. Computer gives wrong information especially when it is faulty. Use of CAI may be exposed to problem of maintenance of computers due to lack of skilled personnel in the field of computer.

8. Students may feel overwhelmed by the information and resources available to them Over use of multimedia may divert the students' attention from the content
9. Teaching and learning becomes too mechanical
10. Lack of good CAI packages at the students' disposal
11. Lack of infrastructure

Conclusion

In the light of the importance of ICT, CBI and CAI in classroom instruction, more research studies need to be conducted by Nigerian researchers in the field of ICT, CBI and CAI. This will enable them borrow a leaf from the developed countries and adopt the current global trend in the field of ICT, CBI and CAI for instruction particularly at University level. This will help stop the production of "analogue graduates" who cannot fit into the practice of modern technology by Nigerian universities. It will also help in broadening the existing indigenous literature on the use of CAI as an effective classroom instructional strategy. Finally, classroom instruction will be easier and more effective through the use of ICT, CBI and CAI particularly during this era of dwindling economy.

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