THE USE OF COMPUTER-AIDED INSTRUCTIONS (CAI): THE TOOL FOR THE ADVANCEMENT OF EDUCATION IN NIGERIA

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ABSTRACT

The importance of Information and Communication Technology (ICT) in education cannot be overemphasized; it is a global phenomenon. The Nigerian government introduced computer into its educational system in 1987. Twenty-three years after, much has not been done regarding the use of this valuable tool to aid classroom instructions in the country. The nation is presently facing a lot of challenges in instructional delivery system as students record poor performances in School Certificate Examinations. This study, therefore, seeks to investigate the use of Computer-Aided Instruction as the tool for the advancement of education in Nigeria. It uses qualitative methods for data collection and analysis. Open interviews were conducted on a total of 12 respondents comprising of 4 lecturers, 1 school principal and 7 educators from public schools. The interviews were recorded with a video camera. The members of the public were selected based on accidental sampling while other respondents were selected based on purposive sampling technique as only those that specialize in areas relevant to the study were selected. This study presented common problems associated with the use of CAI and suggested remedies.

INTRODUCTION

Computer-assisted Instructions (CAI) can be defined as instructional programs or software packages used to aid instruction and help the individual learner achieve the desired instructional objectives in the shortest possible time. It is basically an interaction between a student, a computer controlled display and a response entry, one can deduce the following about CAI:

o   There is an interaction between an individual student and the computer in a way similar to that between the teacher and the individual student in a classroom or any other instructional process.

o   The computer displays the instructional material to the individual student.

o   The individual student interacts with the displayed material and responds to it.

o   The interaction between the individual learner and the computer device helps in the realization of the set instructional objectives.

Computer Aided Instruction (CAI), as an application of computer in education, requires both the learners and their teachers or instructors to be highly computer literate for the instructional programs to be adequately utilized. When both teachers and learners acquire the necessary skills to operate a computer, they stand the enviable chance of reaping optimally the enormous benefits inherent in CAI. CAI enhances teachers' instructions in many ways. They come in various computer programs which are interactive and can illustrate concepts through attractive animation, sound and demonstration. The computer guides the learners' thinking, responds to the learners' questions, assesses the learners' performances and gives the learners immediate feedback. For instance, if the learner gives a wrong answer to a problem, the computer leads the learners to the right answer by giving a step-by-step assistance that will lead the learners to discover their error(s).

Due to the interactive nature of CAI, it easily catches students' attention and is highly effective. For instance, Jegede and Ajewole (1992) studied students' attitude with the use of a computer in learning and the effect on achievement. They observed that students that worked together co-operatively using the computer performed better than those that did it individually and those that did not learn with the computer.

Statement of the Problem

Computer Assisted instructions are increasingly being utilized particularly in the developed world and in some of the developing countries. This is because Information and Communication Technology (ICT) holds out the opportunity to revolutionize pedagogical methods, expands access to quality education, and improves the management of education system (World Bank, 2002). Unfortunately, in Nigeria, classroom traditional patterns of education have remained largely unchanged (Enweremadu, 2001). The National Examinations Council (NECO) disclosed recently that over 75 per cent of the candidates that sat for its June/July 2010 Senior School Certificate Examination (SSCE) failed the examination (NECO, 2010). These problems seem to suggest that a radical change is urgently needed in their instructional delivery system and the use of CAI needs to be explored.

Purpose of Study

This paper seeks to investigate the use of Computer-Aided Instruction as an instructional mode in the teaching and learning process in Nigeria.

Research Questions

The study seeks to answer the following:

1) To what extent are the technologies of CAI available in Nigeria for teaching and learning?
2) To what extent are members of the Nigerian public aware of Computer-Aided Instruction?
3) To what extent is CAI beneficial to Nigerians in the teaching-learning process?
4) How challenging is the use of CAI in the school system in Nigeria?

LITERATURE REVIEW

The link between education and ICT in modern time cannot be overemphasized. In fact, educational websites now compete with e-business. Many offer degrees online while all major universities now offer a form of course content and credits online. The largest investment in ICT perhaps has been in the United States. However, among the developing countries, China stands out particularly for the efforts it is making to use it to expand education (Olubamishe et.al, 2006).

Nigeria is also making effort in this direction. For instance, in 2001, the country launched a National Policy on Information and Communication Technology followed by concrete initiatives such as the creation of the National Information Technology Development Agency (NITDA), a dedicated agency of the Federal Ministry of Science and Technology, and the National Institute of Information Technology (NIIT), (Owhotu, 2006). Thus, the Nigerian government has come to realize the important role of ICT as a major material for learning.

Geban (1996) compared CAI and another method of teaching. In this study, the control group was taught using a problem-solving approach while the experimental group was taught with CAI. The experimental group was found to have performed better than the control group. Jackman (1997) also compared the effect of lecture method and computer simulation on the performance of freshmen university students in laboratory applications. The group that received the CAI instruction also performed better than the control group. Rahmon (2008) studied the effect of CAI in promoting the understanding of Mathematics. He used a sample of thirty students each with varying ability level in the control and experimental groups. A pre-test was given to the two groups. After the pre-test, the experimental group was taught with CAI while the control group was taught using traditional method. The students were tested again after treatment. The

experimental group treated with CAI was found to have done better than the control group treated with traditional method.

The learning materials have greatly expanded because of the various technological advances. Instructional materials include more conventional materials such as the blackboard, overhead projectors, television sets slide projectors, and opaque projectors, as well as newer materials, such as LCD projectors, camcorders, digital cameras, scanners, the Internet, satellite, interactive TV, audio and video conferencing, the computer and various software applications. These instructional materials are the technologies that are directly hinged on the provision of CAI in our schools. However, there are a lot of problems militating against the provision of adequate equipment, materials and infrastructure for CAI in our school system. These problems, according to Maduekwe (2006), are categorized as follows:

- Environmental Problems: Micro-electronic products like computers thrive best in cool and dust-free environment. Yet, most schools do not have such environment. Many schools do not have enough buildings and classrooms, let alone libraries and laboratories where these computers can be kept and utilized.

- Infrastructural Problems: For the computer to be fully operational, it would need regular supply of power. This is absent in so many schools and indeed in so many parts of the country. The result is that installed computers lie idle most of the time because of power cuts while frequent fluctuations in power voltage can lead to mechanical breakdown and cause damage to gadgets. People may resort to power generators or plants but they have to frequently buy diesel or petrol as well as maintain them. This is an expensive alternative that deters many schools from setting CAI.

- High Cost of Computer Hardware: CAI components like computers, projectors, scanners, printers etc, are quite expensive to procure. Added to this is the relatively high cost of installing and maintaining a computer. Although Nigeria is witnessing a boom in computer marketing, little thought has been given to the repairs and service/maintenance of the few existing gadgets and their eventual replacement by locally procured ones so as to indigenize the IT industry.

- Imported Technology: Another serious problem is that of importing new technologies wholesale without sufficient thought to how they should be integrated within the existing infrastructure or have clearly defined objectives. There is a marked tendency to acquire quite a variety of gadgets

in the name of technology with the result that maintenance becomes impracticable since there is often a dearth of appropriate spare parts.

Maduekwe (2006) also gave the following challenges as militating against the use of CAI in Nigeria:

Quality of Teacher Education Program: The quality of teacher education remains the cornerstone of any educational system. Yet, teacher educational institutions in Nigeria have not effectively responded to the need to integrate information technology (ICT) into the teacher preparation programme. Most teacher training institutions in Nigeria lack computer hardware for training purposes. Teachers are only exposed to introductory courses in instructional technology and basic computer knowledge, but not on courses that integrate ICT into the teaching of their various subjects. Reports thus indicate that new teachers have limited knowledge of how to work in a technology-enriched classroom or how to use technology in their professional practice

School Curriculum: The school curriculum should be redesigned in such a way that it will be flexible and resourceful to integrate technology into its teaching. Since most Nigerian teachers are not exposed to information and communication technology integration, it will be very difficult to have competent teachers who can use ICT gadgets effectively in our schools. Moreover, some teachers are afraid of the IT innovation. They fear that computers may sooner or later take over their jobs so, they shy away from them hence the techno phobia syndrome.

METHODOLOGY

The phenomenographic research approach was used in this study. The research design for this study was descriptive survey design. This method was found appropriate because it aims at inductively accumulating information of descriptive nature about events via observation, Nwokwule (2002). In this study, an interview guide was used to elicit information from respondents.

Sample and Sampling Technique

Twelve respondents were interviewed for the study. The twelve respondents were made up of three lecturers from the Faculty of Education,

University of Lagos, one lecturer from the Federal College of Education (Tech) Akoka, the Principal of Laureate College, Oshodi, and seven members of the public. The members of the public were selected based on accidental sampling as only those encountered by the researchers' roving cameraman in the Federal College of Education (Tech) premises were interviewed. Other respondents were selected based on purposive sampling technique as only those that specialise in areas relevant to the study (i.e. Educational Technology, Adult Education, Curriculum and School Administration) were interviewed.

Research Instrument

The instrument used for data collection was semi-structured interview. The semi-structured format was preferred because unlike the unstructured, it makes data management easier, and unlike structured, its flexibility allows the interviewer to probe further. The interview guide was developed by the researchers to cover questions relating to the area of study and in such a way that desired data could be extracted. The respondents and their responses were recorded with a video camera.

Validation and Reliability of Instrument

The interview guide was critically examined and analysed for face validation by a group of research experts in Educational Technology, Educational Measurement and Evaluation. Their criticisms and advice were used to correct the instrument. Thus, the semi-structured interview guide was validated for both face and content validity. Also, a few preliminary interviews were conducted before the main interviews. This was done to detect any weaknesses in methods, questions and recording devices. No defect was detected. The same favorable result was experienced after the main interviews. Thus, the instrument was found to be relatively stable and consistent for the study.

Data Collection

Data were collected through semi-structured interviews of 12 respondents, which comprised of 4 lecturers, 1 school principal, and 7 members of the public. The respondents were asked questions on issues relating to the study. Such issues included; the literacy level of Nigerians, efforts of government on education, the various forms of Computer-aided Instruction being used in the country, their challenges in using it as well as how beneficial and popular it is among the citizens. Six researchers were involved in the study. They are Master students of

Educational Technology and their supervisor in the Department of Science and Technology Education, Faculty of Education, University of Lagos, Nigeria.

DATA ANALYSIS

The views of individual respondents interviewed that were recorded are as follows:

Two participants were asked the background questions

1. What is our literacy level?

This question was posed to Dr. 'Supo Jegede, the Head of Department of Adult Education, Faculty of Education, University of Lagos.

Dr. Jegede responded, "Number one, corruption must be dealt with. God has blessed us enough in this country to be able to manage the condition of our people. If corruption is taken away and the money that is going into each program is utilized for the program, then that is the starting point." He continued, "Secondly, we have to try to change the attitude of Nigerians. What I mean is this: we depend mostly on imported goods. That cannot promote and develop entrepreneurship attitude in our people." He went on to talk about small and medium scale enterprises (SME). He was of the view that government should help them to expand. He indicated further, "People like fishermen, how do they preserve their fish? Government has to be interested in the local fishermen and train them on how they can preserve their fish as well as how they can market them anytime they want."

Dr. Jegede was not happy with the way government handles entrepreneurial skill development in our schools. He pointed out that it was not an academic work. He advised that entrepreneurs who had excelled in their various fields should be invited to schools to share their success stories with students. He also spoke on the need for constant electricity power supply particularly to help the SMEs to grow as most of then cannot afford the luxury of being owners of generating sets.

He reiterated his call for the eradication of corruption in the country, pointing out that millions of Naira earmarked for developmental projects are usually diverted into private pockets. This, according to him, is the problem facing our society.

2. To what extent has government improved the quality of education from the colonial era to date?

This question was posed to Prof. 'Bade Adegoke of the Department of Curriculum Studies, Faculty of Education, University of Lagos.

Prof. Adegoke responded, "When you want to talk in terms of government's efforts, we have to approach it in its historical perspective and also look at the type of popular offerings prevailing at a particular time. So, we look at the colonial government, especially before independence in 1960. You know at the time of colonial arrangement, the type of education we were running here was the type that was planned for the British colonies. So, the type of curriculum they offered was the type that was purely colonial and we also have to note that the Missions, starting with the Christian missions, owned schools." He said the philosophy of education then was specifically for catechists, church officials, clerks, and teachers who at that time had attained standard six, grade three and grade two levels.

He continued; "The emphasis then was on provision of basic education focusing on literacy, numeracy and the basis was that there should be a little bit of elementary science, a little bit of geography, a little bit of history, etc. But as time went on, there was this fierce need to improve the school curriculum. However, with the coming of independence, there was this call that the curriculum should be reviewed and this came into in 1965, 1966, 1967 or so. That period led us to the curriculum conference in Nigeria which came up in the 70s and that gave birth to the National Policy on Education".

He further explained that the policy is being reviewed periodically and that with modifications here and there, it has become the benchmark i.e. the standard that the country now uses. The policy, for instance, according to Prof. Adegoke, came up with a new curriculum that structurally says that we have six years primary, three years junior secondary, three years senior secondary, and then four years of university, polytechnics or colleges of education. "The restructuring too," he continued, "was not a fundamental restructuring as such, but the adjustment is that you spend six years and then instead of saying six years of primary schooling, we now extend it to include the three years they are to spend in the junior secondary. We call this, the basic education that is given to the Nigerian citizens."

Prof. Adegoke further explained that the basic education has enriched the curriculum in that we now have new subjects to teach and the curriculum contents of each subject has also improved by way of introducing new concepts, new ideas, etc. He described the idea of making modifications to curriculum content as a way of ensuring that the curriculum is as competitive and as enhanced as possible, so that the students benefit optimally. He mentioned some challenges militating

against curriculum reforms as the lack of co-operation of some parents who oppose the idea of allowing their children to go for technical-vocational instead of the grammar school education type as well as the none inclusion of certain vital resources and equipment by the curriculum planners. He further explained that even where they were included, some of the equipment might have either gone obsolete or might not have been installed at all. He lamented that the major problem facing the curriculum in this country is poor implementation. Speaking on government's commitment to a sound and effective curriculum for the country, he said, "So, the development has been that of taking off from what appeared to be a colonial form of education which we inherited from our British colonial masters. The country has tried to at least bring improvement so that the government knows exactly that we want the education of the citizens to be for the purpose of the growth and development of the country. So, they came up with modifications and with new ideas injected into the curriculum. For example, apart from the missionaries, government came in. They had their own schools. As time went on, there was school takeover starting with one military administrator in the east and this became wide spread.

Later, some state governments retuned schools to their original owners many of which are the missionaries. However, he went on,, "in spite of this arrangement, the curriculum is still being given as a standard. Meaning that, whether the school is publicly owned or privately owned or whatever, the curriculum they are using is the one that is handed over or given by the government."

The government also has certain standards in terms of quality assurance measure on who should teach. Who should teach what? What should be the qualifications? What should be the duration of training whether NCE or first degree? Prof. Adegoke also observed that the establishment of certain bodies by government helped to regulate the curriculum. Such bodies, according to him, are NCCE (National Commission for Colleges of Education), NUC (National University Commission) as well as Teacher Registration Council to register teachers, discipline them and ensure that the standards (the professional ethics) are being well maintained. Concerning the role of Nigerian Union of Teachers (NUT) in curriculum development, he said, "Then again, the NUT as a professional body is being encouraged not to limit its activities to unionism alone. For example, NUT is being encouraged and is doing that very well, to look at the curriculum innovations and staff development etc." He mentioned some additional efforts being put in place by the government: "These are the things that governments here and there, whether at the federal or state level, are trying to do

and in fact, we have some state governments that also buy textbooks for students in primary schools".

He went further, "We have bursary, scholarships and loans given to needy children so that the citizens who cannot afford to pay for their education, will have the opportunity of benefiting from these arrangements. These are just some of the efforts of the government. Government pays the salaries of their own teachers just as the missionaries pay the teachers they employ in their schools." However, in terms of integration of ICT into the educational system, he said, "You have to bear in mind that when the national policy on education was being formulated, Information and Communication Technology wasn't known; but now it is the global phenomenon. The curriculum should be responsive depending on the trend, the preferences and the value. So, computer is a new trend and the curriculum especially for a country that wants to be part of the global movement should respond accordingly. What is happening now is that at the primary school level, the idea is that Information and Communication Technology should be included at all levels. In fact, the effort is that both teaching and learning should take advantage of the computer so the lecturers and students have to be computer literate. Those whose training pre-dated the advent of computer will have to be retrained. They have to go and learn the art and science of computer so that they can apply it both in their research and in their teaching."

Research Question 1: *To what extent are the technologies of CAI available for teaching and learning?*

Dr. Blessing Adeoye, a lecturer of Educational Technology in the Department of Science and Technology Education, University of Lagos, was asked this question. He responded, "Computer aided instruction is part of the emerging tools in educational technology. Examples are CD-ROM and programmed instructions. However, on daily basis, tools that we use for CAI grow because of emerging technologies."

He talked briefly about the benefits of CAI. He said, "there are so many benefits of CAI. It helps students to stay focused and it also helps teachers to get the attention of the students. Then, again some people say that it's expensive but I want to say that it's economical for the fact that you can use them over and over. It helps us as well to reach out to students that are less fortunate; it also helps those that might be far away or those that do not have the opportunity to come to school on a daily basis especially, those that are involved in distance education and some other students that are less privileged or challenged in some areas."

Explaining the term, 'computer aided instruction', he said, "there are so many programs that we use as computer aided tools. As long as you are able to use the computer to help in teaching and learning, it will fall under the definition of computer-aided instruction which people call CAI. We have different programs like programmed instructions. We call them computer-aided instruction because you are able to use the computer. You can either program the instruction or you buy an already programmed one or maybe, even some of the educational media that have to do with gaming media, they all fall under computer aided instruction. In other words the only thing I can tell you is that when you look at all the tools that we use in teaching and learning, as far as you are using computer to help you to facilitate teaching and learning, it will fall under the category of computer aided instruction."

He also categorized Internet as CAI. He went further, "Internet definitely is CAI tool and one of the reasons is that you cannot get on the Internet without using a computer. It is the vehicle that helps you to get on the Internet. It happens to be one of the tools that we often use." Explaining the difference between computer education and CAI, he said, "when you talk about computer education, you are actually learning about computer. You may learn about the invention of computer or about the history of computer. But Computer-aided Instruction ,education."

Research Question 2: *To what extent are members of the Nigerian public aware of Computer-aided Instruction?*

This question was posed to the respondents from the Federal College of Education (Technical) Akoka,-Yaba, Lagos. Specifically, they were asked to say what they knew about Computer-aided Instruction. All of them claimed ignorance of CAI. The respondents were made up of six (6) students of the institution and one (1) visitor.

Research Question 3: *To what extent is CAI beneficial in the teaching-learning process?*

This question was posed to Mr. M. O. Ogunsola, the Principal Laureate College, Aviation Estate, Mafoluku, Oshodi, Lagos. Mr. Ogunsola replied that his school invested so much in CAI equipment so as to improve the quality of education being given to the students. According to him, they have forty (Pentium five) computers for the students' use.

Speaking on how his school has benefited from the use of CAI, he said, "presently, the students are able to use power point for presentations. They also use Spreadsheets, Microsoft Word, Corel Draw as well as Microsoft Excel. CAI has been quite effective in the school and we are happy with the performance we are getting from the students."

Comparing the traditional system with the computer-aided system of teaching, he said, "we were using the traditional system before we became ICT equipped and we realized that students are now able to do things with more ease than in the past. We also discovered that it has saved us a lot of time in communicating with the students and we are now able to get more done within the same period of each lesson than the traditional classroom because it's interactive and some of the information is already programmed on the system."

He continued, "the students are doing quite better. They are able to get a lot done within a shorter time than with the traditional system and then we discovered that they've been able to have more information at their disposal due to the computer aided instruction system. They are able to get more than what the teacher is able to do with them in the normal classroom." Speaking on how students use the internet facility provided by the school, he said, "the students are able to get on the Internet and get information on any topic and any subject whatsoever. So, they are giving us more than we are even giving them in the classroom when they write their exams and do their projects. We have seen that it's quite a wise decision for us to embrace computer aided instruction" He complained that using computer-aided instruction to teach is capital intensive, as it requires a lot of money. According to him, the initial cost of setting up the school's Internet facility was six million Naira. Speaking on their challenges, he said, "we have two major challenges in using it. These challenges are poor electricity power supply and the challenge of maintenance of the hardware."

Research Question 4: *How challenging is the use of CAI in the school system in Nigeria?*

Mr. Emmanuel Agbugbuem, an Educational Technology expert and a senior lecturer at the Federal College of Education (Tech.), Akoka, Lagos was asked to state the challenges being faced by their school in using CAI. He responded, "one of the problems is the high cost of providing basic ICT infrastructure in our schools. As a result, we don't have enough computers in our schools." He continued, "tied to this problem is inadequate funding of education as well as lack of conducive teaching-learning spaces in our schools. This conducive teaching-learning environment has to do with the thermal condition,

192

the visual condition and other aspects of the environment." He also stated that poor noise control, inadequate lighting condition and poor thermal situation in the school environment militate against the use of computers as instructional medium in our schools.

Perhaps, the major challenge of using CAI in our schools, according to Mr. Agbugbuem, is the problem of erratic electricity power supply. Other challenges mentioned by him are the problem of poor ICT skills of students and some of the teachers, lack of experts who can produce instructional programs, and the problem of negative attitude towards the use of computers.

Speaking on the solutions to the problems, he said, "Government should ensure that there is regular electricity power supply. Also, there should be ICT training for both students and teachers and experts for the production of instructional materials.

Summary of the Interviews

The interviews conducted revealed that:

1. The literacy level of Nigerians is low. However, there is room for improvement. If illiteracy is to be eradicated totally, corruption must first be dealt with because most of the money earmarked for educational development is usually diverted to private use.

2. Governments over time had put a lot of efforts at educating the citizenry by building on the curriculum inherited from the colonial masters. Series of curriculum conferences were organized and these eventually gave birth to the first National Policy on Education in the 70s. This policy is being reviewed periodically and currently, Nigeria operates 9 years of basic school, 3 years senior school, and 4 years tertiary institution now referred to as 9-3-4 system.

3. Computer aided instructions are the emerging tools in educational technology and they come in various forms: some of which are CD-ROMs, programmed instructions, the internet and so on.

4. There is low awareness of CAI among Nigerians as none of the people interviewed claimed to know CAI.

5. The benefits of CAI are enormous. For instance, it enables the students to be more focused, it saves a lot of time, it is interactive, it saves a lot of energy for the teacher, and it expands the scope of the students.

6. The challenges of using CAI in the school system include high cost of ICT infrastructure, erratic electricity power supply, lack of conducive environment, negative attitude of teachers to the introduction of computers,

poor ICT skills of teachers and students and the dearth of experts in the field of instructional program production.

RECOMMENDATIONS AND CONCLUSION

The following recommendations are made:

1. Government should intensify efforts at fighting corruption in the country.
2. Teachers should be continuously trained and retrained in the use of ICT.
3. Efforts should be made to produce experts in the field of instructional program production and encourage them.
4. Computer- aided instructions (CAI) should be fully integrated into the teaching of each subject of study of the school curricula at all levels.
5. Our school environment should be upgraded to a level that is conducive for the use of CAI.

Computer aided instructions (CAI) are increasingly being utilized particularly in the developed world and in some developing countries. Nigeria too, a nation craving for international recognition and advancement, should not be left out of this information revolution. It is therefore, important that government should create an enabling environment for the use of CAI by providing necessary equipment, training and infrastructure. This will invariably help learners to concretize abstract concepts which will in turn assist them in achieving excellent grades in school certificate examinations.

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