Journal of Library Services and Technologies, *3*(2), 87 – 100, 2021
ISSN: 2616-1354 (Print) 2636-7424 (Online) Available online at credencepressltd.com
10.47524/jlst.v3i2.88

Maximizing the benefits of computer aided instruction for effective learning of electronic libraries course among third year students in federal tertiary institutions in Anambra State

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Abstract
The paper investigated the benefits of computer aided instruction (CAI)for effective learning of electronic libraries course among third year students in federal tertiary institutions in Anambra state. Descriptive survey was adopted. The sample of the study comprised 60 respondents made up of male and female students in Federal College of Education (Technical),Umunze and Nnamdi Azikiwe University, Awka. Three research questions guided the study while one hypothesis was tested. The research instrument was questionnaire which was validated by experts. Data collected were analyzed using mean and standard deviation The study revealed benefits of CAI to third year Electronic Libraries course students. Training was recommended for new intakes and lecturers to enable them acquire ICT skills for use of computer aided instruction. This area is less researched especially as it relates to teaching Internet and electronic libraries as a course in a developing country like Nigeria. A replication of this study could be done using other Library and Information Science courses such as cataloguing and classification, serials management and oral tradition.

Keywords: Computer aided instruction, electronic libraries, students, federal tertiary institutions, library and information science, Anambra State.

Introduction

Electronic libraries (EL) can be described as a course which occupies a unique position in Library and Information Science curriculum. It is an information communication technology (ICT) course offered in library and information science departments. EL, which is also known as Internet and Electronic Libraries course, is the type of learning carried out through the use of computer, Internet and web technology. Electronic library is a course designed to provide students with knowledge, thinking/manipulative, and fast learning skills. EL deals with the study of electronic resources, online resources' access, operations, integrated search and management. It occupies an indispensable place in library education. Possession of adequate knowledge of EL by a student occupies a central place in his/her understanding of electronic libraries and improves his or her level of achievement. Through the application of a range of multimedia technologies and Internet, EL widens students' horizon in the learning process.

Effective teaching is very important in teaching and learning process. According to Umah and Nwokike (2016), effective teaching occurs when a teacher has imparted the right skills, knowledge and attitudes to the students. Effective teaching cultivates thinking skills; stimulates interest in the subject and motivates learners to learn. In Nigeria, tertiary institutions are categorized into three: polytechnics, universities and colleges of education. Poor academic achievement of students in EL can be improved with innovative teaching and learning methods combined with new technology (computer aided instruction) and conventional method such as modified lecture method. Modified lecture method is a traditional/conventional method of teaching. It is a teaching method in which

the presenter or lecturer teaches orally to a group of class participants and creates a break in the lecture during the process of teaching and learning in other to give room for relevant demonstrations or activities (Dimgba, 2016). The integration of new technology such as computer aided instruction (CAI) in teaching and learning has changed the way education is handled, causing rapid transformation in all spheres of life.

CAI is a product of information and communication technology (ICT); they are content delivery methods which compliment conventional based teaching method in any classroom environment.Although the importance of ICT in education cannot be overemphasized, its integration in teaching and learning process is a multifaceted process which involves more than just the technology but also the curriculum, pedagogy, institutional readiness and teacher competencies (Hoque & Alam, 2010 cited in Nannim, 2018).

The emergence of CAI in classroom instruction delivery has transformed content delivery and improved the quality of education in tertiary institutions. According to Ehirheme and Iyiola (2016), CAI refers to use of computer as a tool to facilitate and improve instruction. It is a teaching method whereby computer is used as a tool to carry out teaching and learning process and enhance students' academic achievements. The researchers listed the following benefits: Privacy helps the shy and slow learner to learn: multimedia helps to understand difficult concepts through multi-sensory approach; freedom to experiment with different options.

Effective use of computer assisted instruction/computer aided instruction, as used in this study, refers to successful use of CAI instruction among the third year Electronic Libraries course students to facilitate their comprehension of the course content faster. A study by Nwosu and Ndanwu (2020) has shown that students' academic achievements in EL have remained poor. Several reasons were identified as causative factors to the poor academic achievements but teaching method was adjudged as prominent among the factors.

Many students in tertiary institutions have benefited from CAI in the teaching and learning process. Computer aided instruction is the same as computer assisted instruction. CAI gives room for interactive and active participation of all students in the classroom. The learner can work and manipulate the computer at his own pace without supervision. It gives room for individualized instruction where each learner decides when to learn (Okoli & Onyeagba, 2016). CAI enables one to one interaction, it is a great motivator, enhances academic achievement and interest of students in Electronic Libraries (EL) course (Ehirheme & Iyiola, 2016; Nwosu & Ndanwu, 2020). CAI is a *sine-qua-non* for effective actualization of academic achievement among the teeming students of EL as well as other Library and Information Science courses.

In recent times, Nigerian government has been making frantic efforts to ensure educational institutions in the country are technology-oriented (Adomi & Kpangban, 2010; Yusuf, 2011). CAI tools such as computers etc. have been introduced in school curriculum and laboratories. This is aimed at making the students acquire skills that will boost their knowledge of EL and take advantage of e-learning. EL can be taught both through formally and informally through use of CAI. In each case, the lecturer is the presenter while CAI is used as a tool to facilitate and improve instruction.

Unfortunately, the present method of teaching and learning EL in tertiary institution in Nigeria and Anambra state in particular as observed by the researcher may

undermine the academic achievement and interest of students and stated objectives of EL learning. The increasing rate of poor academic achievement and low interest of students in EL in tertiary institutions is becoming a concern to educators. Among the factors is predominant use of lecture method. According to Enwere (2016), the lecture method is lecturer centered with the lecturer acting as repertoire of knowledge while the students are passive listeners or dormant recipients of the lessons.

The use of computer in instruction is known in various terminologies: Computer Enriched Instruction (CEI), Computer Assisted Instruction (CAI), Computer Managed Instruction(CMI), Computer aided instruction (CAI) and Computer Based Education(CBE). Computer aided instruction or Computer Assisted Instruction (CAI) has been defined as a systematic approach to developing students' knowledge and/or skills that uses a computer as a central feature to support instruction via activities including, but not limited to, presenting materials, assessing progress, and guiding activities (Anhoina as cited in Root, Stevenson and Davis,2018).

The use of CAI in tertiary institutions has become a vital research topic among educators since the integration of computer into education. Wang (2017) opined that the "appearance of CAI shows the improvement of teaching methods and means, as well as the change of teaching idea and teaching content". CAI promotes students' acquisition of skills and access to academic content (Root, Stevenson & Davis, 2018).

CAI is a powerful instructional technique in the teaching and learning process because it provides an interaction between an individual learner and the computer just as it happens in the tutorial system between the teacher and the individual learner, and is able to display the instructional material to the individual student (Olagunju as cited in Julius, 2018).

Schankas cited in Julius (2018) summarized the benefits of CAI in classroom practice as follows:

i. It gives opportunities to both students and teachers to be quicker in instruction, promotes student engaged learning, increases learners' motivation, provide learners with abundant sources of information and support collaborative learning.
ii. It changes the role of the teachers from knowledge transmitters to facilitators, from primary source of information to knowledge navigator and co-learner, fromcontrolling and directing all aspects of learning to giving learners more options and responsibilities for their own learning.
iii. It can change the role of the learners from passive consumers of information to active participants in the learning process, from reproducing knowledge to producing knowledge, and from learning as a solitary activity to learning collaboratively with others.

Ikpe (2016) draws on knowledge from the fields of learning, cognition, Human computer interaction (HCI) among others. He further opined that CAI programmes use tutorials, drill and practice, simulation, and problem solving approaches to present topics, and they test the students' understanding.Oguama, Ugwuoke and Ogbodo(2018) investigated the effect of CAI on students' academic achievement in physics in senior secondary schools in Nkanu West Local Government Area, Enugu State, Nigeria. The researchers observed that the use of CAI must have facilitated and improved instruction, and recommended that government should

regularly sponsor students and teachers to attend annual short-time trainings and seminars on Computer Literacy and ICT; that government should provide well equipped ICT centers in every secondary school to enhance the use of CAI in teaching and learning Physics.

CAI is a learner-centered technique which stimulates participation that brings out desirable behavior, satisfaction, knowledge and interaction between the learner, the teacher and the computer. It improves classroom instruction as it widens students understanding of the content and gives room for active participation on the part of the learner. It captures students' attention, promotes spirit of competitiveness, engages them as they interact and help them to study at their pace, master the skill/concept before moving ahead (Access Center, 2004).

Teachers need to adopt important strategies in the use of the teaching method .Ogut *et al*. and Acar as cited in Yesilyurt, Dogan and Acar (2019) recommended the following strategies: teachers' realization of such activities as preparing the educational environment, recognizing the students' talents, individualization appropriate to their talent, steering, training and repetition.

According to Yesilyurt, Dogan and Acar (2019), the disadvantages of CAI are as follows:

i. Working by using computer is absolutely harder than turning the pages of the books.
ii. In CAI, students' interaction with computers block interaction among the students, consequently students lack socialization.

Baki (2001) opined that although computer is thought to be very useful in instructional environment, its use is delayed due to many reasons, such as: efforts to implement technology in traditional methods, lack of qualified teachers and the belief that computers would replace the teachers.

Statement of the problem

The emergence of new technology in tertiary institutions in Nigeria at all levels has boosted teaching and learning. In view of the drastic changes in technology and benefits of computer assisted instruction/computer aided instruction in education; the Federal Government of Nigeria has planned "to use information communication technology (ICT) in its educational development plans and never to be caught in the web of technology" (Federal Republic of Nigeria, 2004; Okoli & Onyeagba, 2016). The use of CAI in teaching and learning has impacted meaningfully in EL course. Moreover, the use of effective technology in tertiary institutions is gaining more ground and for effective teaching and learning of EL to take place in this 21st century, there is need for effective utilization of these technologies by learners. It is on this note that the researchers deemed it necessary to investigate the strategies for maximizing benefits of Computer aided instruction and factors militating against its' effective usage.

Objectives of the study

The general purpose of the study was to ascertain the benefits of CAI to third year Electronic Libraries course students. Specifically, the study sought to:

1. ascertain the benefits of computer aided instruction to third year Electronic Libraries course students in federal tertiary institutions in Anambra state,
2. find out the factors that militate against effective CAI usage by third year Electronic Libraries course students in federal tertiary

institutions in Anambra State, and
3. find out the strategies for maximizing computer aided instruction to the benefit of third year Electronic Libraries course students.

Research questions

The following research questions are answered in this study:

1. What are the benefits of computer aided instruction to third year Electronic Libraries course students in federal tertiary institutions in Anambra state?
2. What are the factors militating against effective computer aided instruction usage by third year Electronic Libraries course students in federal tertiary institutions in Anambra State.
3. What are the strategies for maximizing computer aided instruction to the benefit of third year Electronic Libraries course students?

Hypothesis

The following null hypothesis was formulated to guide this study.

1. There is no significant difference between the mean ratings of male and female Electronic Libraries course students on strategies for maximizing the benefits of computer aided instruction to Electronic Libraries course students.

Literature review

CAI is an acronym for computer assisted instruction/computer aided instruction. Computer today has changed the landscape of education and has led to an era of computer usage in teaching and learning which has made computer literacy a must for all. Computer assisted instruction (CAI) is an innovative method of instruction that encourages interaction and instruction between the computer and a learner (Mezieobi, Onyeanusi, Chukwu & Chukwu, 2019). Since the 1960's Computer assisted instruction(CAI) has been promoted as the new standard for teaching and learning (Brown, Mongan,Kusic, Garbarine, Fromm, Fontecchio (nd). They further opined that schools were provided with computers and internet connections at an astounding rate in the 1990's but there was no correlated increase in student performance. Cai is simply a tool to help assist students in understanding the instruction (Christensen, 2016). Computer assisted instruction encompasses a broad range of technigue that supplements the classroom teaching and learning environment (Oden, 2021). Computer assisted learning has modernized the way that students learn, both in the average classroom as well as in language-learning settings. (Scott, 2021). She further opined that computer assisted learning can make lessons much more interactive and engaging, and can pique the interest of even the most reluctant of pupils.

CAI is absolutely a medium of instruction. The appearance of computer aided instruction (CAI) shows the improvement of teaching methods and means, as well as the change of teaching idea and teaching content(Wang,2017). Computer aided education eases the process of learning (Cingi, 2013). Life without computers would seem almost unimaginable for many individual using computers daily (Cingi,2013). In CAI information is presented on computer's display, students are asked to respond, and there response is evaluated (Hussain & Ali, 2012)

The computer could be accessed individually or as a group unlike in a conventional classroom where students are lumped together irrespective of their individual differences and class size (Laleye,

2019, cited in Usman & Madudili, 2020). Computer aided instruction involves the use of computers to supplement classroom instruction (Anuoluwapo, 2019). He further opined that computer aided instruction does not fully replace the teacher in a classroom environment. Computer can be used to assist instruction, manage instruction and aid its design (Oden, 2021). He further opined that when computer is used to assist instruction, it is referred to as computer assisted instruction(CAI). CAI can allow learners to visualize, explore, and formulate scientific explanations for scientific phenomena that would otherwise be impossible to observe and manipulate (Ikpe, 2016). CAI was utilized to personalize learning for many students with physical and language limitations and who are learning disabled (Tolbert, 2015). CAI also has several attributes useful to adult student; it offers privacy, patience, feedback, individualization, and control (Shamsideen, 2015). According to Shamsideen (2016) :

1. Computer's capacity to allow learner's choices over content as well as provide immediate feedback on the learner's responses makes it particularly well suited to maintaining the motivation of a student as he or she progresses.
2. Computers give students a sense of empowerment and control**.**
3. Students can control the pace and repeat lessons when they feel the need to do so; thus, they can progress.
4. It provides an opportunity for experimentation, and builds realism and relevance into the learning situation.

Koni, Zephaniah, and Okoro (2019) stated that CAI provided integrated experiences which varied from abstract to concrete; helped the teacher to reduce repetition of words; improved students manipulative skills; improved visual perceptions and retention of information by the learner.Besana and Gabunilas (2020) revealed that computer assisted instruction(CAI) is a term applied to a teaching or learning situation involving interaction between computer and student.He further opined that computer assisted instruction is advantageous in clarifying scientific concepts and more useful in stimulating the different levels of the cognitive domain, in enhancing visualization and reorganization of science facts in the learners' cognitive structure and in increasing the retention level of students as compared to traditional methods.

Research literature evidence on CAI globally, revealed the positive impact of CAI on students' academic achievement (Olga, 2008, Serin, 2012; Ahiatrogah, Majoub & Bervell, 2013; Charagu, 2015 cited in Julius, 2018) Studies have indicated that an up-to-date method of teaching, computer aided instruction (CAI),can be a valuable supplementary aid used to improve student achievement (Tolbert, 2015). Researcher have shown that as a teaching method CAI enhances learning i.e, students learned the same amount of material in less time than the traditionally instructed students or learned more material given the same amount of time (cotton, cited in Ikpe,2016). Ikpe, (2016) further reiterated that students receiving CAI also retain their learning better.

If lecturers strictly adhere to the use of computer aided instruction in teaching , the quality of learning with regards to the academic achievement of students, retention of students and interest of students will not be questioned. These are the result of a good teaching method which make them eligible to be used in teaching process both in primary and tertiary institution level. When planning for lesson, academic achievement

is crucial. In general, academic achievement refers to performance outcomes in intellectual domains taught at school, college, and university (Spinath,2012). He further opined that as an indicator of intellectual education, academic achievement is the most important prerequisite for individual and societal prosperity. Interest can be referred to as an activity one enjoys and devoted free time in doing or studying (Ifeakor, 2015). While retention can be described as the ability of a learner to keep memories about the facts and figures in learning experiences (Lasisi, 2018). He further opined that retention can also be seen as someone's ability to recall past experiences or recognize what has been learned or experienced from memory.

Methods

The descriptive research design was used in conducting the investigation. The population comprised of 100 third year electronic libraries students in all the federal tertiary institutions in Anambra State offering electronic libraries in Library and Information Science Department in Anambra State.The names of the Federal tertiary institutions are Nnamdi Azikiwe University, Awka, Federal College of Education (Technical) degree awarding section, Umunze and Federal Polytechnic Okoh.Federal polytechnic okoh was rejected because it was not a degree awarding institution.The population for the study consisted of 100 third year library and information science from two tertiary institutions in Anambra state that offer electronic libraries.Simple random sampling was used to select 60 students from the two federal tertiary institutions(Nnamdi Azikiwe University, Awka and Federal college of education (technical) Umunze) under study. Two institutions were selected by purposive random sampling technique. Sample consisted of 60 third year EL students. The third (3^{rd}) year students' were chosen because the foundational e-learning knowledge required to study library and information science course is impacted at this level. A self-constructed questionnaire was the instrument used to collect data from the respondents on a four-point Likert scale. The instrument was validated by the researchers. To establish the instrument's reliability, copies of the questionnaire were administered on a sample of twenty 3^{rd} year electronic libraries students in Imo state who wetre not included in the population of the study. The application of Statistical Package for Social Sciences (SPSS) version 20 using Cronbach Alpha reliability method on the obtained data yielded a score of 0.82. The response options are Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD). The research questions were answered using mean and standard deviation while the hypotheses were tested using *z*-test at 0.05 level of significance. In answering the research question, a mean score of 2.5 was considered as being significant while a mean score below that is 2.5 was considered none significant.

Results

The results of the study are presented according to the research questions and hypothesis.

Research question 1: What are the benefits of computer aided instruction to third year electronic libraries course students?

The data in Table 1 are used to answer this questions.

Table 1: Mean responses of respondents on the benefits of computer aided instruction to third year electronic libraries students in federal tertiary institutions in Anambra State (n = 60)

Benefits	Mean ($\bar{X}$)	Std. Deviation	Remarks
It provides opportunities for active participation	3.55	0.75	Agreed
It provides immediate feedback	3.83	0.36	Agreed
It facilitates self-pacing	3.33	0.95	Agreed
Students learn instructional contents faster with CAI	3.43	0.93	Agreed
A powerful instructional tool for enhancing classroom instruction	3.18	0.99	Agreed
CAI will make lesson practical and interactive and hence the students understanding of the concept will be clearer.	3.78	0.55	Agreed
Grand Mean	3.52	0.63	Agreed

Table 1 shows that students agreed that the six benefits indicated are benefits of the benefits of CAI to EL course students as indicated by the mean score of above 2.50.

Research question 2: What are the factors militating against effective utilization of computer aided instruction by third year electronic libraries course students in federal tertiary institutions in Anambra State?

The data in Table 2 are used to answer this questions.

Mean responses of respondents on factors militating against effective utilization of computer aided instruction by third year electronic libraries course students in federal tertiary institutions in Anambra state (n = 60)

Factors	Mean ($\bar{X}$)	Std.	Remarks
Paucity of qualified lecturers	3.37	0.96	Agreed
Ineffective teaching method	3.45	0.96	Agreed
Paucity of information and communication technology facilities	3.12	1.17	Agreed
It can be expensive/ cost effective	3.20	0.95	Agreed
Teachers may find it difficult to implement the package	3.15	1.15	Agreed
Grand Mean	3.26	0.84	Agreed

The result in Table 3 shows that all the items are some of the factors that militate against effective utilization of computer aided instruction by third year EL students with mean scores above 2.50.

Research question 3

What are the strategies for maximizing the benefits of computer aided instruction to third year EL course students?

The data in Table 3 are used to answer this questions.

Table 3: Mean responses of respondents on strategies for maximizing the benefits of cai to third year EL students in federal tertiary institutions in Anambra State (n = 60)

Item	Mean ($\bar{X}$)	Std. Deviation	Remarks
Lecturers and students should be encouraged to utilize the computer aided instruction for enhanced learning and teaching and academic achievement of students.	3.65	0.70	Agreed
Training should be organized for electronic libraries lecturers on the use of computer aided instruction by Government, university management professional bodies.	3.22	1.07	Agreed
Item3			Agreed
Curriculum writers should include computer aided instruction in tertiary institution curriculum and as part of teaching methods.	3.13	1.09	
Tertiary institution management and government should equip tertiary institution with necessary computer aided instruction facilities to leverage the potentials of computer aided instruction	3.83	0.37	Agreed
The government at all level should organize conference, seminar and workshop for lecturers especially electronic libraries lecturers	3.40	0.97	Agreed
Lecturers should endeavor to adopt computer aided instruction method as a variety tool in electronic libraries classrooms.	3.70	0.69	Agreed
Grand Mean	3.49	0.74	Agreed

Table 3 shows that the respondents agreed that the six items are necessary strategies for maximizing the benefits of computer aided instruction to electronic libraries students with mean score of 2.50 and above.

Hypothesis 1: There is no significant difference between the mean ratings of male and female electronic libraries students on strategies for maximizing the benefits of computer aided instruction to the electronic libraries course students.

The data in Table 3 are used to test this hypothesis.

Table 4: Summary of t-test analysis of significant difference between the mean rating of male and female electronic libraries students on strategies for maximizing the benefits of computer aided instruction to the electronic libraries students (Females = 46; Males =14)

Gender	N	$\bar{X}$	SD	Df	Z- cal	*P	*Z-tab	Decision
Female	**46**	3.41	0.83	58	-1.59	0.12	1.67	**NS**
Male	**14**	3.76	0.13					

The result of table four reveals that the mean responses of male and female third year electronic libraries course students on the strategies for maximizing the benefits of CAI to ELthird year students are 3.41 and 3.76 respectively. Since the z-calculated is less than the x-tabulated value at 0.05 level of significance, the null hypothesis is accepted. Therefore, the mean responses of male and female third year EL students on strategies for maximizing the benefits of CAI to EL students do not differ significantly.

Discussion of the findings

Table one contains the analysis of data with regards to the benefits of computer aided instruction to third year students studying electronic libraries course. The results revealed that there are benefits which can be derived from computer aided instruction by third year EL course students. These include use of combination of computer simulation activities, multimedia, tutorial, and practice programs and opportunity for active participation of students. It enhances classroom instruction and draws students' attention to the classroom, gives immediate feedback, facilitates self-pacing, and arouses students 'interests. This is in line with the view of Oguama, Ugwoke and Ogbodo (2018).

Data in table 2 reveal the factors militating against effective utilization of CAI by third year EL students in federal tertiary institutions in Anambra state. The factors include ineffective teaching method, paucity of ICT (computer aided instruction facilities) and ICT support tool, deterioration of the teachers' role in the learning process and more expensive. This finding is in line with opinion of Yusuf, and Afolabi,(2010) that CAI activities appear to be at least as cost effective as and sometimes more cost-effective than other instructional methods, such as teacher –directed instruction and tutoring.

Table 3 shows that some of the strategies for maximizing the benefits of CAI include special training on how to use ICT (especially CAI) should be organized for both new intakes; that government and tertiary institution management should ensure the provision of well-equipped ICT centers in all tertiary institutions and that curriculum designers should incorporate CAI into teaching activity. This result agrees with the statement of Oguama, Ugwoke and Ogbodo (2018), that government should provide well equipped ICT centers in every secondary school in order to facilitate the use of CAI in teaching and learning.

Conclusion

Electronic libraries course has come a long way. Therefore, lecturers strive for excellence and sustainability of library education through its use in order to improve academic achievement of students. The benefits of computer aided instruction

method cannot be over emphasized; hence its use and implementation will help to enhance, arouse and improve students' academic achievement and interest.

Based on the above findings, the following are recommend:

1. Training should be organized for new intakes (graduate staff) by management of tertiary institutions to enable them acquire ICT skills.
2. Management of tertiary institutions and government should endeavor to provide well equipped ICT centers in every tertiary institution.
3. Electronic libraries course lectures should be encouraged to adopt the use of computer aided instruction in delivering their lectures as this will help to improve the academic achievement of students.
4. Electronic libraries course students should be given access to computer aided instruction tool owned by tertiary institutions from year one to encourage student and reduce students' phobia about computer manipulation and usage in learning.
5. Computer aided instruction should be included in the institutions' curricula to ensure that it is used for lecture delivery.

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