Effects of Computer Assisted Instruction (CAI) on Academic Performance of Senior Secondary Students in Economics, Kwara State

Surajudeen Olayiwola ADEGBOYE
Department of Social Sciences Education
Faculty of Education, University of Ilorin, Ilorin, Nigeria
adegboye.os@unilorin.edu.ng +2347064282799

Abstract
The computer is one of the greatest inventions of the 20th century which has contributed to the service of humanity through its capacity to automate the highly needed respective earlier discoveries. Therefore, the role of computer cannot be over-emphasized in the current competitive education system. It plays significant role in many aspects of human endeavor. The challenge therefore is to be able to remain relevant in the competitive education system through the adoption and use of modern technology. The research design was quasi experimental using a sample of 120 students, who were assigned into experimental and control groups. The test instrument, Economics Performance Test (EPT) was a 30-item multiple-choice objective test drawn from the past West African Examination Council (WAEC) Senior Secondary Certificate Examination Econmics paper. Also introduced was the treatment instrument, Computer Assisted Instructional Package (CAIP) on Economics. The two groups (experimental and control groups) were subjected to the EPT as pre-test and after the treatment the two groups were rearranged for EPT as post-test. The research questions were answered using mean and standard deviation, while the hypotheses were tested at 0.05 level of significance using t-test analysis. The research finding showed that the use of CAI in teaching Economics will effectively enhance the teaching and learning of the subject more. It was therefore recommended that necessary attention should be accorded CAI as a method of instruction in Economics.
Key Words: Computer Assisted Instruction (CAI), Conventional Method, E-learning, Education Technology, Economics

Introduction

Economics occupies a unique position in the school curriculum. It is central to many social science and management related courses. Economics as a subject in senior secondary schools has dual status, that is, it is both a core subject for students in social science/commercial class or art class while students in science class offered it as elective subject either because of the uncertainty in term of future career or for the fulfillment of maximum requirement of nine subjects by WAEC/NECO. Again, the potential benefits of Computer Assisted Instruction (CAI) cannot be underestimated in the contemporary world. It is obvious that the current trend in research all over the world is the use of

computer facilities and resources to enhance students' learning. There are now several CAI packages on different subjects.

The recent moves of knowledge explosion in technology have brought about changes in the educational system. Technology is utilized in enhancing instruction thus shifting from teacher centred conventional methods. Ochoyi and Ukwumunu (2008) reported that the use and increasing growth of technology in the classroom provides new opportunities for delivery of instruction. Falola and Jolayemi (2020). Observed that the use of multimedia technology has revolutionised education and training by changing the way teachers teach and train as well as how students learn. They further remarked that teaching with technology has always yielded positive results by way of improving academic performance in almost all subject areas.

The field of education has not been unaffected by the penetrating influence of information and communication technology. Undoubtedly, ICT has impacted on the quality and quantity of teaching, learning, and research (Yusuf, 2005). He further asserts that, ICT can enhance teaching and learning through its dynamic, interactive, and engaging content; and also provide real opportunities for individualised instruction. Information and communication technology has the potential to accelerate, enrich, and deepen skills; motivate and engage students in learning. To facilitate the accomplishment of goals, aims and objectives of education for overall growth and development, the recent trend of information revolution and knowledge explosion in technology have enabled changes in the system of education of every nation (Habib, Muhammad & Hajjakaltum, 2019). They further opined that the use of technological gadgets in teaching and learning which simplify learning has necessitated a shift from instructor-centered to individualized or learner-centered education.

Computer Assisted Instruction (CAI) is defined as a teaching process directly involving the computer in the presentation of instructional materials in interactive mode to provide the controlled, individualized learning environment for each individual student (Habib, Muhammad & Hajjakaltum, 2019). There are now several CAI packages on different subjects. It is obvious that the current trend in research all over the world is the use of computer facilities and resources to enhance students' learning. This may be the reason why Okolo (2022) opined that many exercises that depart from traditional method

are now readily accessible on the web, even though teachers do not use these facilities. He further observed that the interactive approaches to lecturing significantly enhance learning. Advantages of Computer-Assisted Instruction (CAI) as identified by Adegboye (2017) include: Immediate feedback- the interactive terminals which keep students interacting and eager to keep trying; active participation- whereby weaker students are obliged to participate actively and not remain passive in lectures; No annoyance- where the computer will wait patiently for an answer and does not express annoyance with wrong response; graphics facility-which are interactive graphics that makes possible to sample many more illustrations that could easily be shown in a textbook; mathematical calculations- which can be done as readily for realistic examples as for artificially simple class that can be solved analytically; and accurate data- where large volumes of data can be handled with accuracy and without drudgery.

Yusuf and Afolabi (2010) opined that research is inconclusive regarding the comparative effectiveness of conventional instruction alone and CAI alone, and that computer-based education (CAI and other computer applications) produce higher achievement than conventional instruction alone. In addition, students learn instructional contents faster with CAI than with conventional instruction alone, they retain what they have learned better with CAI than with conventional instruction alone, and CAI activities appear to be at least more cost-effective than other instructional methods.

Economics is perceived as how the limited supply of resources are used for the satisfaction of unlimited wants. Thus, the importance of teaching economics in secondary schools is to help students understand human behavior, such as how people achieve their wants, how people interact in the process of buying and selling. It also helps students understand how firms, companies and government make goods and services available for the people in order to satisfy their wants (Okunloye, 2010). He further opined that Economics encourages and prepares students to be prudent and effective in the management of scarce resources. Nigerian Educational Research and Development Council (NERDC, 2008) also observed that a major objective of economics curriculum is to enable students to contribute intelligently to discourse on economic reforms and development as they affect Nigeria. As a course, it equips students with the basic principles required for higher education. Omosewo and Akanmu (2013) also described

economics as an elective subject under humanities, and students may only choose the subject if it is within their field of study or as an elective outside their field of study. The philosophy of economics in the Nigerian educational system is to present it as a subject that has relevance in everyday life and could prepare graduates for an entrepreneurial career in the future (NERDC, 2008). Students' negative attitudes towards teaching and learning of Economics and other social sciences has been traced to the use of inappropriate method of teaching, irrelevant instructional materials, teachers' personality and lack of preparation by teachers before teaching (Okunloye, 2010).

There are certain variables that can influence people's perception of particular issues. Such variables include gender, age and professional experience. The issue of gender is so sensitive particularly in the present generation that its influence on people's perception cannot be over emphasized. Yusuf and Afolabi (2010) observed that gender issues have also been linked with performance of students in academic tasks in several studies but without any definite conclusion. But there is a general conclusion that general imbalance exists in computer use, access, career and attitude.

Adegboye (2017) asserted that the adoption and application of Information and Communication Technology (ICT) in teaching at senior secondary school level has come to occupy an important place in the education sector and national development and indeed the development of the world. This is because it has not only ensured scientific and technological development but it has also opened up more learning opportunities, improved the techniques of teaching and production of materials which reduce time consumption and distance. The introduction of computer in education has not only been found to improved access to learning by all and quality knowledge delivery; its application has also been significance in the teaching-learning process. This may improve students' achievement in some subjects where students' performance is very low (WAEC Chief Examiners' Report, 2010). Educators utilizing technology to enhanced instruction have increased in number across a variety of disciplines and the method has been proven to be effective. Research has indicated that technology in the classroom can be useful in pedagogy management and an effective teaching enhancement (Ajayi, 2002). He further described technology as a systematic and integrated organization of man, machine, idea and procedure to achieve a desire goal.

The persistent problem of poor performance of student in economics at senior secondary level remains very worrisome to stakeholders. Scholars have attributed the problem to the incompetence of the teachers and poor method of teaching by the inexperienced teachers, who are not well established in the dynamics of the subjects. Adeoji (2005) has suggested that the demand of the secondary school economics syllabus is so high that only competent and experienced teachers who can teach the subject effectively by employing various effective strategies and tactics to carry the learners along should be made to handle it at this level of education for better results. He further asserted that the adoption of ICT in teaching of economics in secondary schools could be helpful in the task of capacity building and negative view in this direction could constitute a draw back to the achievement of our science and technology objectives.

Adegboye (2017) observed that ICT is not effectively used in our classroom's situations. This is partly because most of the teachers are not computer literate, therefore making it difficult for them to operate ICT materials. He further added that the issue of power is another problem affecting ICT application in the classroom. The personal observations and experiences of the researcher, as well as his discussions among colleagues informed his deduction that most teachers in the Senior Secondary Schools in Kwara State do not make use of computer as modern teaching aids in the teaching and learning of Economics in the classroom. This study therefore seeks to investigate the effects of Computer Assisted Instruction (CAI) on academic performance of secondary school students in economics in Kwara State.

Purpose of the Study

The purpose of this work is to ascertain the effects of CAI on students' academic performance in economics. Specifically, the study sought to determine:

i. the effects of computer Assisted Instruction on academic performance of students in Economics in Senior Secondary Schools in Kwara State.

ii. whether or not there is difference in performance between male and female Economics students in Senior Secondary Schools in Kwara State taught through Computer Assisted technique and those taught using conventional method.

Research Questions

The following research questions guided this study:

   i.   To what extent does Computer Assisted Instruction have effect on academic performance of Economics students in Senior Secondary Schools in Kwara State?

   ii.   To what extent does the use of Computer Assisted Instruction have effect on the performance of male and female Economics students in Senior Secondary Schools in Kwara State?

Research Hypotheses

The following hypotheses were tested at 0.05 level of significance:

Ho_1: There is no significant difference between the academic performance of Economics students taught with CAI and those taught with traditional teaching methods in Senior Secondary Schools in Kwara State

Ho_2: There is no significant difference between the academic performance of male and female Economics students taught using CAI and those taught with conventional methods

Methodology

     This study was a quasi-experimental type, of the pre-test and post-test control group design. The population for the study consisted of all the students of Economics at SSS level in Kwara State while the target population was the SSS 1 Economics students. The research sample was purposively selected because research on CAI must necessarily be conducted in schools where computers are not only available for students' use but where the students are computer literate. The sample was drawn from 12 senior secondary schools across the three senatorial zones of the state. From these 12 schools drawn for the study, 10 SS1 students in each of the twelve schools were used as sample for the study. The sample for experimental group and control group was 61 and 59 respectively. A total of 120 senior secondary school students (SS1) composed the sample of the study. The test instrument, Economics Performance Test (EPT) was a 30-item multiple-choice objective test with five options each which were drawn from the past

West African Examination Council (WAEC) Senior Secondary Certificate Examination Economics paper. Also introduced was the treatment instrument, Computer Assisted Instructional Package (CAIP) on Economics. It was a self-instructional, interactive package that lasted for 1 hour. The two groups (experimental and control groups) were subjected to the EPT as pre-test. Then, the students in the experimental group were exposed to CAIP which had been installed on desktop computers. The control group students were also exposed to the conventional teaching method on the same contents used for experimental groups. After the treatment the two groups were exposed to the EPT which had been rearranged as post-test. The research questions were answered using mean and standard deviation, while the hypotheses were tested at 0.05 level of significance using t-test analysis.
.

Results

Ho₁: There is no significant difference between the academic performance of Economics students taught with C.A.I. and those taught with traditional teaching methods in Senior Secondary Schools in Kwara State

Table 1: Summary of the 2- Way Analysis of Covariance showing academic performance of Economics students taught with CAI and traditional teaching methods

Source	Sum of Squares	Df	Mean Squares	F	Sig
Corrected Model	337.667	2	337.667	1.331	.000
Intercept	699.579	1	699.579	16.423	.000
Pretest	28.921	1	28.921	3.77	.731
Treatment	333.643	1	333.643	5.321	.000
Error	3097.965	118	57.321		
Total	151213.001	120			
Corrected Total	11347.231	119			

S= Significant; Total= 200; p<.05

The table 1 above revealed that Computer Assisted Instruction (CAI) as an innovative instructional tool had a significant effect on students' academic performance in Economics. Since the p-value .000 is less than the level of significance 0.05, the

hypothesis is rejected. Therefore, the null hypothesis of no significant difference between the academic performance of Economics students taught with CAI and those taught with traditional teaching methods is rejected. Consequently, there was a significant difference in the performance of Economics students after the application of CAI.

Ho$_2$: There is no significant difference between the academic performance of male and female Economics students taught using C.A.I. and those taught with conventional methods

Table 3: t-test showing the analysis of Post-test Mean Scores of Economics students based on gender

Group	N	Mean	S D	df	t	Sig	Decision
Female	58	35.44	13.24				
				118	-.68	.51	Accepted
Male	62	32.29	15.10				

Table 3 shows the t-test result of the post-test mean scores of the male and female students. The result showed male (X=32.29; SD=15.10) while the female result showed (X=35.44; SD=13.24). With the p-value .51 which is greater than 0.05, the null hypothesis is accepted. This implies that there is no significant difference in the mean scores of male and female students in the experimental and control groups. They responded equally to the experiment.

Discussion of findings

The result of the study revealed that, there is significant difference between the academic performance of Economics students taught with C.A.I. and those taught with traditional teaching methods. This is clearly illustrated through the divergence between the pre-test and post-test mean scores of the students. The use of technology in education has become standard component in many courses and school subjects. Eze (2012) agreed with the finding by positing that technology applications are not limited to only classroom situations but are also replacing some classrooms session contacts virtual contacts or online courses. The noble objectives of Education could not be achieved without utilizing the technology called ICT in the training of the learners through the integration of CAI. Abubakar (2010) submitted that the use of computer applications in

teaching has no doubt contributed immensely to the delivery of knowledge. It has made the teaching and learning process more exciting and easier to understand. Adegboye (2017) equally summarized that the immediate feedback provided by interactive terminals (CAI) keeps students interacting and eager to keep trying. Enuku & Ojogwu (2006) also agreed that the use of CAI creates room for individualized instructions which further helps students adjust to their attention span and provide valuable and immediate feedback for literacy enhancement.

It was also revealed in the study that there is no significant difference between the academic performance of male and female Economics students taught using CAI and those taught with conventional methods. This shows that students' gender did not influence their performance in Economics. This agreed with the finding of findings of Yusuf and Afolabi (2010) which showed that gender had no influence on the performance of students in biology whether they were taught with CAI in individualised or cooperative setting.

Conclusion

The use of CAI improved students' academic performance in economics significantly. Also, the influence of CAI application is not gender biased. There is no significant difference in the performance of both male and female economics students after the application of CAI.

Recommendations

In the light of the findings and conclusions made in this study, the following are therefore recommended in the study:

i. Necessary attention should be accorded CAI as a method of instruction in Economics.

ii. Both male and female economics students should be encouraged to readily embrace the use of CAI, since students' performance in economics does not depend on their gender.

iii. Government should provide computer facilities in secondary schools for teaching and learning, and teachers should employ the use of CAI for their instructions.

References

Abubakar, M.B. (2010). E-learning in Nigerian higher education: The perceived role of academic libraries.ilablet: http://202.44.43.230/prachyanun/iec2011/document/4_Day%202/F2_1.pdf

Adegboye, S. O. (2017). Information and Communication Technologies (ICTs): A veritable Entrepreneurial Tool for Poverty Reduction among Nigeria Teachers. *AITIE*. Available online at: https://ijitie.aitie.org.ng

Adeoji, J. A. (2005). Information Technology Investment in Nigeria Industry. The Progress So Far. Selected Papers for 204 Annual Conference, Ibadan: Nigerian Economic Society.

Adeyemi, T.O. & Olaleye, F.O. (2010). Information communication and Technology (ICT) for the effective management of secondary school for sustainable development in Ekiti state, Nigeria, *American-Eurasian Journal of Science Research* 5 (2): 106-113.

Ajayi, G.O. (2002). African response to the information communication technology revolution. *ATPS Special Paper* No. 8 [Online]. http://www.atpsnet.org/docs/Ajayi.pdf [Accessed Dec. 23, 2003]

Enuku, U.A., & Enuku, O, (2000). Breaking down the walls: Computer application in correctional/prison education. *Benin Journal of Educational Studies*, 1(2), 64-71

Enuku, U.E. and Ojogwu, E. (2006). Information and Communication Technology (ICT) in the service of the National Open University of Nigeria. *Gale Academic Onefile. Project Innovation Austin LLC*. 127(2): 187

Eze, J. U. (2012). Perceptions and willingness to e-learning secondary school teachers in Nsukka Education Zoneof Enugu State, Nigeria. *Journal of Home Economics Research,* 16, 79-89.

Eze SC& Chinedu-Eze CV (2018) Examining information and communication technology (ICT) adoption in SMEs: a dynamic capabilities approach. *Journal Enterprise Information Management,* 31(2):338–356

Falola, V. O. & Jolayemi, S. B (2020). Impact of Multimedia Technology on the Teaching and Learning of Oral English in Osun State Secondary Schools, Nigeria. *African Journal of Inter/Multidisciplinary Studies*. (2) 1

Habib, M. A., Muhammad, A. M. & Hajjakaltum, A. (2019).Use of Computer Assisted Instruction to improve students' reading skill In English Language. *i-manager's Journal on English Language Teaching,* (9) 1

NERDC, (2007). 9-Year Basic Education Curriculum; Basic Science and Technology for Middle Basic Education Primaries 4-6. Lagos: *NERDC Press.* 55-67

Halpern, D.F. (1992). Further meta-analytic Procedures for Assessing Cognitive Gender Differences. *Journal of Educational Psychology*, 74, 708-712.

Ochoyi, U.E & Ukwumunu, A.I. (2008). Integration of ICT in Secondary School Curriculum in Nigeria: Problems and Prospects. Proceeding of 49th Annual Conference of *Science Teachers Association of Nigeria (STAN)*.

Okolo, O. U. P. (2022). Technology an effective tool for formative assessment among research statistics students in higher institutions in Plateau State, Nigeria. *ASSEREN Journal of Evaluation,* 7(1), 150-158

Okunloye, R.W (2010). Problems facing Teaching and Learning of Economics. A mimeographed lecture note on subject methodology (Economics), Unpublished Ph.D Theses of the Department of CSET, University of Ilorin, Ilorin, Nigeria

Omosewo, O. E. & Akanmu, M. A.(2013). Evolution of Functional Basic and s Secondary Education Curriculum in Nigeria: Implications for Effective Implementation. *Journal of Education and Practice,* 4(22), 73

Yusuf, M. O. (2005). An investigation into teachers' self-efficacy in implementing computer education in Nigerian secondary schools. *Meridian: A Middle School Technologies Journal* 8 (2), 4

Yusuf, M.O. & Afolabi, A.O, (2010). Effect of Computer Assisted Instruction (CAI) on Secondary School Students Performance in Biology. *Journal of Educational Technology*, 9(1). 62-69.