LEVEL OF UTILIZATION OF COMPUTER AIDED DESIGN, INSTRUCTION AND LEARNING BY COMPUTER EDUCATION LECTURERS AND TECHNICAL INSTRUCTORS IN THE COLLEGES OF EDUCATION IN SOUTH EAST NIGERIA

By

Dr. E.N. Onah&Prof.E.E.Agomuo
cunice.onah@unn.edu.ng&dremmagomuo@yahoo.com
Department of Computer Education,
University of Nigeria Nsukka

Abstract

This study was designed to examine the level of utilization of Computer aided design, instruction and learning (CAD,CAI and CAL) by Computer Education Lecturers and Technical Instructors in the Federal Colleges of Education in South East Nigeria. The Study comprised(26)Computer Education Lecturers and seven(7) Technical Instructors from Computer Education Departments of the three Federal Colleges of Education used for the study. Thirty three (33) teachers, therefore, constituted the entire population used for the study. Three research questions and three null hypotheses guided the study. A structured questionnaire made up of 50 items was used to collect data on the level of utilization of Computer aided education technology –CAD, CAI andCAL in the preparation of instructional packages,instruction delivery and evaluation of students' performance.The research questions were answered using mean and standard deviation while the t-test was used in testing the null hypotheses at 0.05 level of significance .The results revealed among others that the level of utilization of CAD,CAI and CAL among Computer Education Lecturers and Technical Instructors wasgenerally high during evaluation except during evaluation involving designs where the mean difference between the two groups of teachers was statistically significant in favour of Computer Education Lecturers. However,during lesson preparation and lesson delivery, Computer Education Lecturers' opinions did not show high level of utilization (HLU) in all the items.Computer lecturers were still better than the Technical Instructors that registered low level of utilization(LLU) in most items. Based on the results, it was recommended among other things that trainingsshould be organized for the two groups of teachersin Computer Education departments of Federal Colleges of Education in South East Nigeria.

INTRODUCTION

Background of the Study

Education for self- reliance is one of the goals of secondary education as seen in the National Policy on Education by the Federal Ministry of Education FME(2009).Every Nigerian citizen expects a graduate from any educational level to acquire skill and use same in performing well in both internal and external examinations and also in gainful employment.Colleges of education are not left out especially federal colleges of education that train teachers at the Federal level. This is in line with Ogwo(2005) who stated that functional vocational education isdesires by all and sundry especially in the Universities and Colleges of education that train future teachers. Ogwo is of the view that functional Vocational and Technical Education has the objective of students' skill acquisition, securing and retention of employment at sub- professional levels.This objective implies that students' are expected to acquire skills and apply them in their daily life activities especially in the Colleges of education where teachers are to teach students as future teachers.

One of the vocational courses taught in the Colleges of Education and Universities in Nigeria is Computer Education. Computer Education according to Students' Hand Book(2016) is defined as a unit under the faculty of Vocational and Technical Education.(VTE).This unit emphasizes knowledge and skill acquisition in Computer concepts. Computer Education is called Computer studies in both Primary and Secondary levels of Education and it is taught as elective at both junior and senior secondary school levels of Education[Federal Ministry of Education-FME(2009)].Computer is a versatile machine used in various professions including Education. Work done by Computer is neater, faster and more accurate than the manual method .According to National Teachers Institute –NTI(2012), teachers use Computer for keeping school records, retrieving records, word processing ,analysing students' performance ,teaching and learning. Instructional materials for teaching and learning in Computer aided education technology include Computer Aided Design,Instruction and Learning(CAD, CAI and CAL). According to Oranu (2006), CAD,CAI and CALare instructional materials developed in form of software for learners , teachers and all that want to acquire knowledge in Computer skills. The researchers viewed Computer aided Instruction, Learning and Design (CAI,CAL and CAD)as Computer aided educational technology used in classroom emphasizing skill acquisition. They are full of advantages as learners view the screen and,therefore, understand and remember what is taught better than the traditional/chalkboard method.CAI is a bulky package used by learners while CAL is teachers' presentation package.CAD is mainly diagrams and designs used as CAI if designed for learners' use and used as CAL if designed for teachers' use (Onah,2015).CAI,CAL and CAD are Computer software packages. Defining a software package, Laudon and Laudon (2001) stated that a software package is a prewritten, pre-coded, commercially available set of programs that eliminate the need for individuals or organizations to write their own software programs for certain functions. These are needed in all institutions especially Federal Colleges of Education that train future teachers.

Computer Education Lecturers and Technical Instructors that teach Computer Education students in Colleges of Education can utilize CAD, CAI and CALpackages in the preparation of instructional packages, lesson delivery and evaluation of students' performance and students may learn with understanding and hence perform well in both internal and external examinations.According to Onah and Agomuo (2009) ,the use of CAD, CAI and CAL are full of advantages to both teachers and students. Teachers are curriculum implementers to students and no one can give what one has not acquired.In line with this, Azuka (2012) indicated that job description for teachers include : that teachers must know the stuff,they must know how to impart the knowledge on the learners artistically.Since CAD, CAI and CAL are full of advantages in teaching and learning processes, the question now is: What is the level to which teachers in the Federal Colleges of Education in South East Nigeria utilize CAD, CAI and CAL in lesson preparation,delivering of lessons and evaluating students that require the use of these Computer packages?This study aims at answering the above question.

Statment of the Problem

Technology aided education packages such as computer aided design, instruction and learning are needed for development and progress in the Nigerian society. Students perform poorly in technology subjects such as Computer Studies(WAEC, 2013).Functional education is desired by all and sundry especially in universities and colleges of education that train future teachers (Ogwo, 2005). According to FME (2009), one of the goals of technical and vocational education in the policy is to provide trained manpower in the applied sciences, technology and business, particularly in craft, advance craft and technical levels. Computer education is also included here for it is one of the technical and vocational education programmes where skill

acquisition is emphasized.Teachers of future teachers are to teach with understanding to promote teaching and learning and increase higher performance.The two groups of teachers teaching Computer education students in colleges of Education include Computer Education Lecturer(CEL) and Technical Instructors (TI) assistants of Computer Education Lecturers in practical. One wonders how these teachers utilize CAD, CAI and CAL for effective teaching and learning.

The uses of Computer in teaching have many advantages and there are mass failures in science and vocational/technological subjects. The researchers seek to determine the level to which CAD, CAI and CAL packages are utilized in teaching and learning by the two groups of teachers in Federal Colleges of Education in South East Nigeria. This study, therefore, aims to ascertain the level of utilization of computer aided design instruction and learning by Computer Education Lecturers and Technical Instructors for effective teaching and learning since teachers are curriculum implementers.

Purpose of the Study

The major purpose of the study was to ascertain the level of utilization of Computer aided design,instruction and learning (CAD,CAI and CAL)by Computer Education Lecturers and Technical Instructors in the Federal Colleges of Education in South East Nigeria. Specifically, the study sought to determine the level to which Computer Lecturers and Technical Instructors utilize:

1. CAD,CAI and CAL in the preparation of instruction.
2. CAD, CAIand CAL in instruction delivery.
3. CAD, CAI and CAL in the evaluating students' performance.

Research Questions

1. To whatlevel do Computer EducationLecturers and Technical Instructors utilize Computer aided design, instruction and learning (CAD,CAI and CAL) in the preparation of instruction?

2. To what level do Computer Education Lecturers and Technical Instructors utilize Computer aided design, instruction and learning (CAD,CAI and CAL) in instruction delivery?

3.To what level do Computer Education Lecturers and Technical Instructors utilize Computer aided design, instruction and learning (CAD,CAI and CAL) in the evaluation of students' performance?

Hypotheses

The following null hypotheses were formulated and tested at 0.05 significance level:

Ho_1: There is no significant difference between the mean responses of Computer Education Lecturers and Technical Instructors on the use of Computer aided design, instruction and learning (CAD, CAI and CAL) in the preparation of instruction.

Ho_2 : There is no significant difference between the mean responses of Computer Education Lecturers and Technical Instructors on the use of Computer aided design, instruction and learning (CAD, CAI and CAL) in instruction delivery.

Ho_3: There is no significant difference between the mean responses of Computer Education Lecturers and Technical Instructors on the use of Computer aided design, instruction and learning (CAD, CAI and CAL) on the evaluation of students' performance.

METHODOLOGY

This Study employed a survey design. The design according to Osuala (2007) is used for studies dealing with people's opinion, beliefs, attitudes, motivation and behaviour.The Study found out opinions of respondents on the levels of utilization of Computer aided design, instruction and learning (CAD,CAI and CAL) in teaching process and as such, survey design was considered suitable for the Study.The Study was carried out in South East Nigeria and covered the Computer Education departments in the three Federal Colleges of Education in the South East geopolitical zone, Nigeria. The population for the study comprised 33 teachers made up of 26 Computer Education Lecturers(CEL) and seven Technical Instructors(TI) from the ComputerEducation departments in the three Federal Colleges of Education in South East Nigeria.The entire population was used due to the manageable size.A structured 50 items questionnaire was used to collect data for both research questions and null hypotheses. The response options on the instruments were weighted as shown: Always(5),Often(4),Sometimes(3),Seldom(2) and Never(1).A higher value indicated a more positive response. Items 1 to 22 elicited data on the level of utilization of CAD,CAI and CAL by Computer Education Lecturers and Technical Instructors during lesson preparation, items 23 to 44 collected data on lesson delivery while items 45 to 50 gathered data on the level of utilization of CAD,CAI and CAL for lesson evaluation.The instrument (50 items questionnaire) was face validated by 3 Computer experts from the department of Computer Education of the University of Nigeria Nsukka. The experts ensured that the items were clearly stated and appropriate for answering the research questions and testing the formulated null hypotheses. The instrument was trial tested using 20 Computer experts from Computer Education Department of the University of Nigeria Nsukka. Cronbach alpha reliability test was used to determine the internal consistency of the instrument which was found to be 0.78.This is in line with Nworgu(2012) who stated that reliability concerns the consistency with which an instrument measures whatever it measures.The structured questionnaire was administered by the researcher with the help ofsix research assistants- two from each of the three Federal Colleges of Education used for the Study.The questionnaire items were collected and used for data analyses.The research questions were answered using mean and standard deviation from data collected on the five point scale of measuring instrument while the formulated null hypotheses were tested using t-test for independent variables at 0.05 significance level. A criterion mean taken as greater than or equal to 3.50(ie $\geq$3.50) was taken as high level of utilization(HLU) while a mean that was less than or equal to 3.49(ie $\leq$3.49) was taken as low level of utilization (LLU) of CAD, CAI and CAL.The three null hypotheses were tested using the t-test statistics for independent variables as shown in the three tables below. Table value of t (ie critical value of t) at 0.05 level of significance was read as 2.02 at n_1+n_2-2 degrees of freedomfor two tailed test (ie 31degrees of freedom).When the calculated t value was equal to or greater than the critical value of t at 0.05 level of significance, the null hypotheses was rejected. However, when the calculated t value was less than the critical or table value of t at 0.05 level of significance, the null hypothesis in this case was not rejected but upheld.

RESULTS

Table 1: Mean, standard deviation and t-test results of responses of Computer Education Lecturers and Technical Instructors on the use of CAD, CAI and CAL in the preparation of instruction.

	Items	$\overline{X}1$	$\overline{X}2$	SD1	SD 2	t-cal	Decision on RQs for CEL	Decision on RQs for TI	Decision on Ho_1
1	Assessing students capabilities with pre-test	3.9	2.0	1.4	1.2	4.39	HLU	LLU	S
2	Presenting educational materials in navigable form	3.0	2.4	1.3	0.99	1.60	LLU	LLU	NS
3	Determining students command of knowledge in practical form	3.8	2.6	1.4	1.4	2.50	HLU	LLU	S
4	Assessing students capabilities with both pre-test and protest	3.2	2.4	1.4	0.99	2.07	LLU	LLU	NS
5	Assessing students command knowledge of adding transition effects to slides to be presented in the PowerPoint	3.9	3.4	1.4	1.2	1.15	HLU	LLU	NS
6	Encouraging distance learning lectures	3.6	3.5	1.5	1.5	0.19	HLU	HLU	NS
7	Slow learners and fast learners and problem solving	3.8	3.6	1.4	1.4	0.42	HLU	HLU	NS
8	Preparing online package to be found on the web with bulky content	3.5	3.2	1.2	1.2	0.73	HLU	LLU	NS
9	Preparing offline package to be found CD-ROM with bulky content	3.4	3.1	0.9	1.4	0.68	LLU	LLU	NS
	10. Instructing students on how to find information on the internet	3.8	2.5	1.3	1.5	0.61	LLU	LLU	NS
	11. Solving problem of overcrowded classroom	3.9	2.6	1.4	1.5	2.57	HLU	LLU	S
	12. Reaching many	3.3	3.0	.96	1.3	0.72	LLU	LLU	NS

learners from different places at the same time								
13. Covering a great number of topics at a time	3.5	3.1	1.2	1.4	0.87	HLU	LLU	NS
14. Considering of individual differences of learners	3.6	2.9	1.5	0.99	1.75	HLU	LLU	NS
15. Any instruction on PowerPoint for offline users	3.9	3.9	1.4	1.4	0.00	LLU	LLU	NS
16. Any instruction on PowerPoint for online users	2.7	2.5	1.5	1.5	0.39	HLU	LLU	NS
17. Transferable principle of practice which encourage functional education	3.5	2.7	1.2	0.88	2.37	HLU	LLU	S
18. Performing engineering drawings or any form of drawing	4.0	3.6	1.5	1.0	1.00	HLU	HLU	NS
19. Performing architectural or environmental design	4.0	3.9	1.0	1.4	0.22	HLU	HLU	NS
20. Carrying out data analysis	3.9	3.5	1.4	1.5	0.75	LLU	HLU	NS
21. Rending a desirable graphic effect for PowerPoint presentation	3.1	2.0	1.1	1.2	2.74	HLU	LLU	S
22. Taking design tasks alone/teams	3.5	2.6	1.2	1.5	1.85	HLU	LLU	NS

Key to the three tables below for lesson preparation, delivery and evaluation of students' performance include: RQs'=Research Questions, t-cal =Calculated value of t, t-critical=Table value of t=2.02 for 31 degrees of freedom. HLU=High level of utilization and LLU=Low level of utilization for each item during lesson preparation, delivery or evaluation of students' performances.

For Computer Education Lectures (CEL): n1=26,x1=Mean,SD1= Standard Deviation for Technical Instructors (TI): n2=7,x2= Mean,SD2=Standard Deviation.

From decisions on Research Question and Null Hypotheses1 in table 1 above, CEL registered LLU in 7items while TI registered LLU in 17 items out of 22 items for instruction preparation.

The difference in mean was significant in 5 items. This is not encouraging since the two groups of teachers teach future teachers.

Table 2: Mean, standard deviation and t-test results of responses of Computer Education Lecturers and Technical Instructors on the use of CAD, CAI and CAL during instruction delivery .

Item no	Items	$\overline{X1}$	$\overline{X2}$	SD1	SD 2	t-cal	Decision on RQs for CEL	Decision on RQs for TI	Decision on Hypothesis 2
23	Instructing learners on how to develop CAI application packages on different concepts in their areas of study	3.9	2.7	1.4	0.88	2.98	HLU	LLU	S
24	Testing students capabilities with pre test/post-test	3.2	2.1	1.3	1.3	0.25	LLU	LLU	NS
25	Presentation of any educational material in a navigable form	3.5	2.9	1.4	1.4	1.50	HLU	LLU	NS
26	Adding transition effect on one's slide	3.5	3.4	0.96	0.96	0.26	HLU	LLU	NS
27	Adding animation and sound effect to enhance one's presentation slide by slide	3.8	3.4	0.96	0.96	0.98	HLU	LLU	NS
28	Creating customers shows so that users can add required effect to all the slide objects at once	3.6	3.6	1.4	1.4	0.00	HLU	HLU	NS
29	Rehearsingslide showsetting up review cycle	3.7	2.7	1.1	0.88	3.09	HLU	LLU	S
30	Packaging one's presentation and running one's slide show.	2.9	2.0	1.4	1.2	2.16	LLU	LLU	S
31	Publishing a presentation to the	1.9	1.8	1.2	1.2	0.27	LLU	LLU	NS

	web.								
32	Learners mastery of CAL application package development	2.6	2.6	1.5	1.5	0.00	LLU	LLU	NS
33	Adding transition effect on ones slide	3.7	3.5	1.1	1.3	0.58	HLU	HLU	NS
34	Adding animation and sound effect on the presentation slide by slide	3.4	2.9	1.4	1.4	0.18	LLU	LLU	NS
35	Creating custom shows to add required effect to all the slide objects at once	1.9	1.8	1.2	1.2	0.27	LLU	LLU	NS
36	Packaging one's presentation and running one's slide show	2.5	2.1	1.5	1.2	0.91	LLU	LLU	NS
37	Publishing a presentation on the web for distant learning problem solving	3.8	3.6	1.4	0.96	0.49	LLU	HLU	NS
38	Development of CAD application packages	3.7	3.1	1.1	1.4	1.71	HLU	LLU	NS
39	Adding transition effect on one's slide	3.5	2.4	1.3	0.99	2.89	HLU	LLU	S
40	Adding animation and sound effect on one's presentation and slide	3.5	2.6	1.3	1.5	2.22	HLU	LLU	S
41	Creating custom show to add effect to all the objects once	3.5	2.7	1.3	0.88	2.12	HLU	LLU	S
42.	Rehearsing ones 43.presentation and setting up a review cycle	3.5	2.5	1.3	1.5	2.46	HLU	LLU	S

43.	Packaging ones presentation and running ones slide show.	3.7	3.5	1.1	1.3	0.58	HLU	HLU	
44.	Publishing a presentation on the web for information sharing by online/offline users.	4.0	3.0	1.0	1.3	3.12	HLU	LLU	

From decision on Research Question 2, CEL registered LLU in 9 items while TI registered LLU in 18 items out of 22 items during lesson delivery. The null hypotheses was upheld in 14 items in favour of CEL. This significant difference constitute worries to educators in the field since no teacher can give skills not acquired to any student.

Table 3: Mean, standard deviation and t-test responses of Computer Education Lecturers and Technical Instructors on the use of CAD, CAI and CAL inthe evaluation of students' performances.

Item no	Items	$\overline{X}1$	$\overline{X}2$	SD1	SD 2	t-cal	Decision on RQs for CEL	Decision on RQs for TI	Decision on Hypothesis 3
45	Testing objectives stated in the CAI package delivery during summative evaluation.	4.0	3.6	1.4	1.0	1.00	HLU	HLU	NS
46	Achieving the objective of students mastery of the use of internet facilities	4.3	4.3	1.3	0.68	0.00	HLU	HLU	NS
47	Testing students knowledge of entry behaviour	3.9	3.9	1.3	1.4	0.00	HLU	HLU	NS
48	Testing students mastery of the use of bullets in the PowerPointenvironment	4.0	3.8	1.3	1.0	0.58	HLU	HLU	NS
49	Testing of a design involving the 3 domains of educational objectives (Cognitive, Effective	3.5	3.5	1.4	1.2	0.00	HLU	HLU	NS

	and psychomotor domains)								
50	Evaluation of objectives of the CAD package presented	3.7	2.8	1.4	1.3	2.08	HLU	LLU	S

Table 3 from t-test analyses showed that calculated t-values were less than the critical values in five items. The null hypothesis was therefore upheld for five items. In one item, the t-calculated exceeded the table value of t. The null hypothesis was, therefore, rejected in one item which is item no 50, which tests the level of use of Computer aided design, instruction and learning(CAD, CAI and CAL) in the evaluation of students' performance, especially during the evaluation of objectives of CAD package presented. Computer Education Lecturers utilize the package highly unlike Technical Instructors that utilize it at low level in most of the 50 items for lesson preparation(1-22),lesson delivery (23-44) and lesson evaluation(45-50).

Discussion on Findings

The results from Research Questions and Null Hypotheses showed that both Computer Education Lecturers and Technical Instructors generally utilized CAD,CAI and CAL during evaluation of instruction. The package for evaluation might have been purchased from market (Laudon and Laudon,2001).The result agree with the finding of (Onah,2015) that CAL package is full of advantages for teaching and learning processes.The problem is on preparation and delivery of instruction. It was found that many Technical Instructors have not fully embraced computer aided design, instruction and learning (CAD, CAI and CAL) as seen in low level of utilization(LLU) in many items during lesson preparation and delivery. It was also found out that the two groups of teachers do not utilize the packages in all the items during lesson preparation and delivery. However, the levels of use of the packages were high during lesson evaluation especially on the part of Computer Education Lecturers who registered high in all the items during evaluation. Generally, Computer Education Lecturers' use the packages more than Technical Instructors in the Computer Education Departments of the Federal Colleges of Education in South East Nigeria.This constitute worry since the two groups of teachers teach computer students who are future teachers.

Conclusion

Based on the findings of this study, the following conclusions are drawn: The two groups of lecturers do not equally utilize Computer aided design, instruction and learning (CAD, CAI and CAL) in both instructional preparation and delivery.During instruction delivery, Computer lecturers utilize the packages more than during preparations of lessons.May be some packages were purchased from the market according to Laudon and Laudon (2001).The two groups of teachers utilized CAD, CAI and CAL during evaluation more than during preparation or lesson delivery. However, levels of use were still higher in favour of Computer Education Lecturers. Technical Instructors' level of use of CAD,CAI and CAL was low during evaluation of objectives of the CAD,CAI and CAL was low during evaluation of objectives of the CAD package presented.

Recommendations

The following recommendations were made:

1.Enough training should be organized for Computer Education Lecturers especially Technical Instructors of Computer Education Departments in the Federal Colleges of Education in the

South East Nigeria on the preparation and use of CAD,CAI and CAL during teaching and learning processes.

2. Authorities in each Federal institution should provide enough Computers for staff and link the Computers to the internet so that the two groups of teachers can download and retrieve already prepared software package for use to enhance teaching and learning.

3. Government should create awareness in all higher institutions that train future teachers on the benefits of e-learning subsets like CAD, CAI and CAL for better understanding of useful concepts in different subject areas including Computer Education.

REFERENCES

Azuka, B. F. (2012). Attitude of Secondary schools mathematics teachers towards the teaching of school mathematics in Nigeria.*Journalof Mathematical Science Education*, 2 (1) Pp181 – 182.

FME (2009). National policy on Education. Roadmap for Nigerian Education sector.Memorandum on restoration of junior secondary componenet in federal unity colleges. Lagos: NERDC press Nigeria.

Laudon K. C. &Laudon,J. P (2001).Essentials of management information systems organization and Technology in the networked enterprise (4th Edition). Prectice – HallInc. Upper sandle river, Newjersey.

NTI (2012). Information and Communication Technology (ICT): Preface for MDG's project. Kaduna: NTI.

Nworgu B. G. (2005). Educational research: Basic issues and methodology (2nd edition). Ibadan: Wisdom Publisher Limited.

Ogwo, B. A (2005).E-learning application lecture for VTE 504 students and functional Education mimeograph, University of Nigeria, Nsukka.

Onah E. N. &Agomuo E. E. (2009).Levelof utilization of computer aided design instruction and learning by lecturers in the faculties of education in the universities in Enugu state. *Unpublished MED thesis*, University of Nigeria Nsukka.

Onah E. N. (2015). Effect of Multimedia Projection on Senior Secondary Students' achievement and interest in Sets in Enugu State, Nigeria. *Unpublished Ph.D Thesis*. University of Nigeria Nsukka.

Oranu P. (2006). Mimography on computer aided educational technology – VTE562 (Computer Education Section), University of Nigeria, Nsukka.

Osuala, E. C. (2015). Principle and Methods of Business and Computer Education Cheston Agency Limited. Enugu: Nigeria.

Students' HandBook(2016).Vocational & Technical Education, University of Nigeria Nsukka.