EFFECT OF COMPUTER ASSISTED INSTRUCTION ON THE RETENTION ABILITY OF TECHNICAL COLLEGE STUDENTS IN ELECTRICAL INSTALLATION AND MAINTENANCE WORK IN ENUGU STATE

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Abstract

This study investigated effect of Computer Assisted Instruction on the retention ability of technical college students in Electrical Installation and Maintenance Work in Enugu State. A research question and a null hypothesis guided the study. Quasi experimental research design was adopted for the study. The sample used for the study consisted of 22 NTC II students made up of 14 males and 8 females. Purposive sampling technique was used to select two schools from Udi and Enugu education zones. An intact class was used in each of the schools which were tagged experimental and control group respectively. The instrument used for data collection was a 50 objective questions developed by the researcher which was administered as pre-test, post-test and delayed post-test to the experimental and control groups respectively. Pearson correlation coefficient formula was used to establish the reliability of the instrument which yielded 0.81 coefficient reliability. The research question was answered using mean scores whereas the hypothesis was analyzed using ANCOVA. The mean scores and ANCOVA were calculated using SPSS version 20. The findings showed that CAI significantly increased the students' retention ability. In view of the finding, it was recommended among others that CAI should be formally adopted in technical colleges, secondary and vocational schools for instruction in Electrical Installation and Maintenance Work to improve retention ability of students.

Keywords: Computer assisted instruction, Retention ability, Electrical Installation and Maintenance Work.

Introduction

Electricity is indispensable in the development of a nation. It has long become one of the basic needs of humanity. In spite of this, the state of electricity in Nigeria is deplorable. This is to say that electricity in Nigeria is unreliable and not dependable. The result has been a gross retardation of development in various

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sectors in Nigeria. Sambo, Garba, Zarma and Gaji (2010) in agreement to this, observed that development in various sectors in Nigeria has been grossly retarded due to the epileptic situation of electric power supply. This undesirable state of power in Nigeria is due to lack of qualified manpower and poor maintenance planning (Emovon, Kareem & Adeyeri, 2010). This therefore implicates the need for trained workforce with requisite skills in the power sector in order to arrest this epileptic state of electricity in Nigeria. In line with this, Daso (2012) and Sylvester (2013) opined that the technical needs of the Nigerian society are competent auto mechanics and truck drivers, carpenters, plumbers, electricians (to maintain Nigeria's power plants), computer database technicians and web/network technicians, medical technicians and vocational nurses.

Among these needs, the crux is the need for electricians or technologists that can handle the sorry state of electricity in Nigeria. Several institutions including technical colleges in Nigeria are annually turning out graduates from courses like Electrical Engineering and Technology, Electrical Technology, and many other related courses. The graduates from these institutions are usually engineers, technologists, technicians, electricians, artisans or craftsmen that increase in number every year.Despite the increasing number of these categories of professionals, the condition of the power sector keeps deteriorating. The assumption is that quality of these graduates who are sent out to the labour market annually is also deteriorating. It is because many of these graduates are trained in skills that are no more sellable in the job market because they are already obsolete. Many others too are not adequately trained for the job. This is simply as a result of the inability of the training institutions to comply with the popular vocational education theory which says that the training environment should be the same or favourably compared with the environment the trainee will work upon completion of his training (Prosser & Allen, 1925). It is therefore necessary to examine the process that produces the manpower responsible for the power sector such as the teaching of electrical installation from the grassroots (college level).

Adequate knowledge of Electrical Installation and Maintenance Work (EIAMW) is pertinent for competent electrical/electronic engineers, technologists, technicians, electricians, craftsmen and artisans. EIAMW is one of the trade subjects offered mainly in technical colleges in Nigeria that has its major objective as to provide trained manpower in the applied science, technology and commerce at sub-professional grades (Federal Republic of Nigeria, 2014). Despite the importance of EIAMW in making robust human infrastructure to address the perils in the power sector and other related sectors, the trade has suffered gross negligence and relegation by the Nigerian society. This is revealed by its absence in so many technical colleges in Nigeria. In Enugu State for instance, only 3 out of the 21 technical colleges registered students for EIAMW in NABTEB examination

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within the year 2011 and 2013 (Science Technical and Vocational Schools Management Board, Enugu, 2014).Even so, it has been observed that the few students that offer EIAMW in NABTEB perform poorly in it. For instance, an analysis of the May/June results of National Business and Technical Education Board (NABTEB) examination from year 2006 to 2010 by Olatunde, the then NABTEB registrar/chief executive, revealed that students performed poorly in EIAMW across the nation and Enugu State in particular. Consequently, this is due to poor retention ability. Also, a review of the performance of students in EIAMW subject in the NABTEB examination in Enugu State from year 2011 to 2013 revealed that students' performance in the subject is unsatisfactory. This has been a subject of concern to the technical educators in a manner that relates the students' poor performance in EIAMW to the teaching methods used.

Several studies show that teaching methods have significant relationship with retention ability of students. For instance, Anyamene, Nwokolo, Anyachebelu and Anemelu, (2012) found that senior secondary school students taught Mathematics using CAI performed significantly better in retention test than those taught same using conventional method. When a concept is taught with a teaching method suited for it, learning increases whereas wrong method of instruction yields poor performance of the learner. That is to say that no teaching method is wrong in itself but every career area has teaching methods that are best suited for instruction. Prominent among the teaching methods used in teaching EIAMW are demonstration and lecture methods. In view of the dynamic and innovative trends in science and technology and consequent curricula review, these methods are not sufficient enough to ensure meaningful learning of EIAMW (Auwal, 2013). Therefore, teaching methods that are more pedagogical with respect to EIAMW in this era of Information and Communication Technology (ICT) are needed. The danger of insisting on these age-long conventional methods is of twofold: firstly, continued insistence on utilizing these methods for instruction may perpetuate the poor performance of students in EIAMW. Secondly, the trainees will be practically unfit in the world of work as a result of technological innovations which conventional method is deficient to handle. The question now is "how can effective teaching of EIAMW be achieved in view of the dynamic technological advancement of this era?"

Computer Assisted Instruction (CAI) may be of great help in answering the question and also in circumventing this problem. In recent times, computer (information and communication technology) has been increasingly utilized as an instructional tool in the classroom. The use of computer in the classroom has culminated to CAI. CAI is simply the use of computer for instruction. It's either used as a tutor or as an aid. CAI encourages individualized instruction and aids learners to learn at their pace. It also saves time, enhances motivation, gives

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feedback and is highly learner centred. According to Chika (2008), the quality of learning and teaching can be significantly improved when ICT is utilized as an intellectual multi-tool.

Several researches have shown that the use of CAI for instruction in certain career areas has significant positive effect on students' retention ability compared to the conventional methods. For instance, Anyamene, Nwokolo, Anyachebelu and Anemelu (2012) in mathematics and Safo, Ezenwa and Wushishi (2013) in geometry. They all confirmed that CAI is more effective in enhancng retention ability in these career fields compared to the conventional classroom instruction. The use of software such as CAI makes it possible that concepts are presented to the students in such an organized manner that makes for greater clarity and easier comprehension (Anyamene et al, 2012). On this basis, this study was designed to investigate effect of computer-assisted instruction on the retention abilityof students in Electrical Installation and Maintenance Work in technical colleges. In this understanding, a research question was posed and hypothesis formulated.

Research Question

What is the difference in the retention ability of students taught EIAMW with CAI and those taught with lecture teaching method as determined by their mean retention scores?

Hypothesis

There is no significant difference between the retention ability of students taught EIAMW with CAI and those taught using lecture method of instruction with reference to their mean retention scores.

Methodology

Quasi experimental research design consisting of non-equivalent control group and experimental group was adopted for this study. Quasi experimental research design was used for this study because there was no random assignment of the subjects to treatment conditions. Nworgu (2015) agreed that in a situation where there is no randomization in the assignment of individual participants to treatment conditions, quasi experimental method is most suitable.

The population of the study consisted of four hundred (400) NTC II students (347 males and 53 females) in the twenty one technical colleges in Enugu State. The sample consisted of 22 (14 males and 8 females) students who were purposively selected from the two colleges. Fifteen students (9 males and 6 females) were selected from Udi Technical College in Udi education zone toform the experimental group while seven students (5 males and 2 females) from Technical College Akpuoga Nike in Enugu education zone served as control

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group. Intact class was used in each of the schools (Udi Technical College and Technical College Akpuoga Nike).

The instrument used for data collection was Electrical Installation and Maintenance Work Retention Test titled EIAMWRT which was developed by the researcher. The second term scheme of work for technical colleges was used. The fifty item multiple choice objective test that made up the EIAMWRT were validated and its reliability determined using Pearson correlation coefficient formula yielded 0.81 coefficient reliability.

The duration of the study was eight weeks. The first week was used for pre-test administration, four weeks for teaching the EIAMW content and the sixth week for post-test administration. Two weeks after the post-test administration, a delayed post-test was administered to ascertain retention ability of the students. The scores obtained from the delayed post-test was the retention scores. The research question was answered using mean and hypothesis was analyzed using Analysis of Covariance (ANCOVA) at 0.05 level of significance.

Results

Research Question: What is the difference in the retention ability of students taught EIAMW with CAI and those taught with lecture teaching method as determined by their Retention mean scores?

Table 1: Means and Standard Deviations of retention test scores of experimental and control group

Source of Variance	N	Retention mean	SD
Experimental group	15	40.60	2.971
Control group	7	28.00	4.967
Mean difference		12.60	

Table 1 reveals that the experimental group with retention mean of 40.60 retained EIAMW concepts taught more than the control group with 28.00 retention mean. Hence, with the mean retention difference of 12.60 between the experimental and control group, CAI is more effective in enhancing retention ability of students in EIAMW than lecture method of instruction.

Hypothesis: There is no significant difference between the retention ability of students taught EIAMW using CAI and those taught using lecture method of instruction with reference to their retention mean scores.

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Table 2: ANCOVA on mean retention scores of students taught EIAMW using CAI and those taught using lecture method

Source	Type III Sum of Squares	df	Mean Square	F-cal	F-crit	Sig.
Corrected Model	3.513[a]	1	3.513	55.797		.000
Intercept	8.872	1	8.872	140.898		.000
Groups	3.513	1	3.513	55.797	4.35	.000
Error	1.259	20	.063			
Total	43.000	22				
Corrected Total	4.773	21				

Significant at 0.05 alpha level; df= 1& 20; critical p≥ 0.000

In Table 2, data presented show that the calculated F-value of 55.797 is due to the difference in retention ability between students in the experimental and control groups. The F-calculated value of 55.797 is greater than 4.35 F-critical value. Also, the p-value (p≥ 0.000), is less than 0.05 alpha level. Hence, at 1 and 20 degree of freedom and 0.05 alpha level of significance, H_o was rejected. The implication of this is that there is significant difference in retention ability between the students taught EIAMW using CAI and those taught using lecture method.

Discussion of Results

Tables 1 and 2 indicate effect of CAI on the retention ability of students in EIAMW. The findings revealed that there was a significant difference in the retention test scores between the experimental and control groups in favour of the experimental group. In specific terms, Table 1 shows that the experimental group had mean retention scores of 40.60 and the control group 28.00 mean retention scores. This shows that students in the control group retained EIAMW concepts taught more than those in the control group. Table 2 indicated that this difference is significant hence cannot be attributed to chance.

These findings agreed with the findings of some related empirical literatures reviewed on effect of CAI on retention ability of students in EIAMW. For instance, Anyamene et al (2012) found that senior secondary school students taught Mathematics using CAI performed significantly better in retention test than those taught same using conventional method. Also, Safo et al (2013) found that the mean retention scores of the students taught geometry using CAI Packages significantly differed from that of the students taught using traditional teaching method in favour of the CAIP group.

The significant improvement in retention ability of students exposed to CAI method of instruction as found in this study could be attributed to certain features

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of CAI such as individualization of instruction. Also, CAI creates multi-sensory channels for learning thereby increasing students' participation in the learning process. Therefore, CAI creates platforms for students' active participation in the learning process rather than being mere recipients hence increasing their retention ability.

Conclusion

Based on the finding of this study, CAI is an innovative and effective mode of instruction with the capacity of improving students' retention ability in EIAMW.

Recommendations

The following recommendations were proffered based on the finding of this study.

1. CAI should be formally adopted in technical colleges, secondary and vocational schools for instruction in EIAMW to improve retention ability of students.
2. Teachers should ensure constant and effective utilization of CAI for instruction in trade and trade related subjects/courses.
3. Training programmes on effective utilization of CAI for instruction should be organized periodically for teachers.
4. The schools should be provided with computers and internet facilities to enable students maximise the benefits of CAI.
5. Training on the development of different CAI software specifically for teaching trade subjects should be organized for indigenous computer programmers as one can hardly find locally produced CAI software. These trainings should suffice curricula reviews.

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