

Effect Of Computer-Assisted Instruction On Student's Academic Achievement And Interest Of Auto-Mechanics Technology In Technical Colleges

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Abstract: The poor academic achievement of students in technical colleges in Nigeria has been a major concern to researchers. The use of effective instructional method in technical colleges will enhance students' academic achievement. This demands that teachers in technical colleges would adopt instructional methods that would improve the academic achievement of students in auto-mechanics technology in technical colleges. This demands that teachers in technical colleges would adopt instructional methods that would improve the academic achievement and interest of students in auto mechanics technology in technical colleges. Four research questions were answered and two null hypotheses were tested at 0.05 level of significance. Quasi-experimental design was used for the study. Population of the study was 128 National Technical Certificate (NTC) year 1 Auto-Mechanics students in state owned technical colleges. Purposive sampling technique was used to draw four schools out of the six technical colleges with 101 students for the study. Instruments for data collection were Auto-Mechanics Achievement Test (AMAT) and Auto-Mechanics Interest Inventory (AMII). The instrument were face and content validated by three experts. Test-retest method was used to establish its reliability of AMAT and was calculated using Pearson product moment correlation which yielded a correlation coefficient value of 0.81 and Cronbach alpha reliability coefficient method was used for AMII and 0.85 obtained. Treatment procedure of computer-assisted instruction and lecture/demonstration teaching method (L/DTM) for the study was carried out. Arithmetic mean and standard deviation were used to answer the research questions while Analysis of Covariance (ANCOVA) was used to test the null hypotheses. Findings of the study revealed that students taught auto-mechanics using CAI package achieved significantly higher and developed greater interest than those taught using L/DTM. Based on the findings of the study, it was concluded that CAI positively affects students' academic accomplishment and stimulate interest in the subject auto-mechanics. It was found more compelling, effective, rewarding and valuable in teaching of auto mechanics at technical colleges. Consequently, it was recommended school administration should provide opportunities for in-service training and equip computer laboratory for auto-mechanics teachers and students to enable them acquire competencies needed in the use of CAI for teaching and learning auto-mechanics trade in technical colleges.

I. INTRODUCTION

Technical colleges is a post-secondary vocational level of education in Nigeria where youths are trained in variety of skills especially in the manual skills. Technical college programme was intended to prepare students for entry different occupations for employment in the world of work (National Business Technical Education Board, NABTEB,

2012). Accordingly, the Federal Republic of Nigeria, FRN, (2014) stated that technical college is a segment of technical and vocational education programme designed to train manpower in the applied sciences, technology and business particularly at craft, advanced craft and technician levels among others. This may involve manipulation of materials or objects in form of task performance, the simple use of spanner to tighten or unscrew a bolt and the complex process

of using a set of tools in a process of dismantling and assembling an engine as applicable in the auto-mechanics trades programme. Thus, knowledge acquired from these technical trade could help the graduates of auto-mechanics trade to secure gainfully employment. Technical colleges run difference programmes among which is auto-mechanics trade programme

Auto-mechanics trade programme in technical colleges involves the application of scientific knowledge in the design, selection of materials, construction, operation, maintenance and repairs of automobiles (Audu, Azian and Muhammad, 2014). It is a skill oriented subject taught with emphasis on theory and practice. The philosophy of auto-mechanics is to trained competent craftsmen and master craftsmen in automobile trade are expected to be skilled to carry out routine services, test and diagnosis service as well as repair of various types of vehicle components Onwusa, (2015). Conversely, computers are now among the tool boxes used by technicians as power tools, run tests, and several more common tools to do their job and provide possible remedies. Besides, high technology tools are needed to fix the computer equipment that operates everything from the engine to the radio in many cars. These sophistication of automobile requires a workforces that could use computerized shop and work with electronic components while maintaining their traditional hand tools (Bathwel, 2013). Similarly, auto-mechanics may employ a wide range techniques and tools in conducting vehicle diagnostic test, ranging from brief physical checks to more involved and computer-based analysis. Auto technicians would have an increasingly broad knowledge of how vehicles' computer components work and interact.

To make the concepts of auto-mechanics subject more concrete and real life situation, it becomes imperative to apply Digital natives' theory. According to Prensky (2001) Digital natives are those born and raised in a digital and media-saturated world. They are immersed in this technology from their early years and so, it is a naturally acquire skills. It is acquired in the same way they pick up their first language. In contrast, Prensky (2001) stated that the *digital immigrants*, are developing digital skills that will always be like learning a second-language rather than being innate. Currently, the Digital natives are being taught by immigrants who are, in effect, not of the same language. To enhance the academic performance of students, there is a need to turn from conventional teaching methods to modern teaching method. It is therefore, becomes imperative for technical teachers to re-structure the classroom and workshop learning environment in way that incorporates computer-based technology such as computer-assisted instruction.

Computer Assisted Instruction (CAI) refers to the use of computer as a tool in teaching and training. CAI is a new teaching and learning strategy in which the topics to be taught is carefully planned, written and programmed in a computer which could be run at the same time in several computer units Andoh, (2012). The instructions are programmed in a computer disc (CD), this could be played in either audio or video system for the student to learn the programmed at his /her leisure time and at his/her own pace. It includes drill and practice, tutorials, simulations, instructional management, supplementary exercises, data base management, word

processing and other types of computer applications. The potential benefit of Computer Assisted Instruction (CAI) cannot be underestimated in the contemporary world. According to Chika (2018), the quality of learning and teaching can be significantly improved when CAI is employed as an intellectual multi-tool. Thus allowing each student to most fully develop their potential, self-motivation of individual group member and could also generate healthy competition. The use of CAI improves students' achievement, fosters and motivates interest toward learning complex concepts. It may possibly endow the learner to integrate theory and practice and apply knowledge, skills and attitudes to develop viable solution to problems and learn independently (Adnan, Audu, Mohd & Sada, 2015).

CAI is space and time independent making it convenient for students to go through the programme either at home or on a school computer. This encourages interactivity, which individualizes content for each learner based on their needs and it provides formative feedback to multiple choice questions. CAI enhances learning rate where the learners are able to learn more materials given the same amount of time as compared to conventionally taught learners. James (2000) in Yusuf (2009) opined that many exercises that depart from traditional method are now readily accessible on the web, though teachers do not use these facilities'. Computers and the internet have been touted as potentially capable means to empower the users for educational changes and improvement, by utilizing various information and resources and reviewing information from different points of view. Hence, cultivating the authenticity and actuality of learning situations, make complicated things simple to comprehend by simulations that once more add to real learning situations. Hence, ICT may act as a facilitator of dynamic learning and higher order thinking.

Utilization of CAI may continue to improve teaching and learning process, yet there are still some limitations such as: teachers' abilities level on computer application and understanding of CAI need to be improved, the courseware lacks students' existing learning difficulties, the teaching emphasize too much on assistant and the teaching process is always taken as a stimulus tool Mustafa, Ashhan, and Turgay, (2011). Also, CAI may be overwhelmed by the information and resources available, over use of multimedia may divert the attention from the content, non-availability of good CAI and lack of ICT facilities and infrastructure. There is a lot of established findings on the instructional value of computer, particularly in advanced countries. It is obvious that current trend in research all over the world is the use of computer facilities and resources to enhance students' learning. If research studies carried out by Mustafa, Ashhan, Turgay, (2011), Chika, (2010) and Yusuf (2009) among others revealed that CAI package could improve academic achievement in some subjects, there is need to examine the effect of CAI on academic achievement and interest of auto-mechanic technology students in technical colleges.

Academic achievement represents the outcome that indicates the extent to which a person has accomplished specific goals that were the focus of activities in instructional environments, specifically in schools. Eze and Okoye (2016) posited that academic achievement is used to measure student's success in educational institutions or how well

students meet the standard set out by examining bodies or the institution. Eze, Ezenwafor and Molokwu (2015) contended that student's academic achievement is dependent on several factors such as, learning environment, instructional methods, and teaching strategy, teachers' attitude, and enthusiasm, as well as students' attitude, and background. Also, the instructional method used by teachers, could challenge students to work at a higher intellectual level that would improve their cognitive and psychomotor achievement. One can estimate how much a learner has learnt the content of an instruction by simply knowing the learner's test score. When suitable teaching method is employed during instructional delivery particularly in auto-mechanics, it could enhance skill performance and inspire students' interest.

Interest is a persisting tendency to pay attention and enjoy some activities (Jimoh, 2010). Musa, (2009) defined interest as a zeal or willingness of participating in activity from which one derives some pleasure. Musa further stated that interest is a tendency to become absorbed in an experience and continue in it. Ogwo and Oranu (2011) laid emphasis on the need for teachers to stimulate students' interest in learning without which students' achievement will be minimal. It is what one perceives in these engagements that shape ones' interest. Interest most often is directly tied to the content or instruction, it also directs and enhances learning. The major problem faced by most students is inability to remember what they have learnt which could result to students performing poorly in achievement test due to lack of interest. Okoro (2015) stated that despite the advocacy that teachers should employ student-centred method which may likely boost the interest of the students in learning of auto-mechanics. Currently, most auto-mechanics teachers at the technical college level still are using lecture /demonstration teaching method (L/DTM).

Lecture/demonstration teaching method (L/DTM) is known as the traditional talk-chalk method of teaching. Here the teacher does the talking while students serve as receiver only by listening and taking down notes. Eze and Osuyi (2018) described lecture/demonstration teaching method as the type of teaching method in which the teacher is the principal actor while the learners watch with the intention to act later. In the same vein, Odundo and Gunga (2013) outlined the advantages some L/DTM of teaching and learning to include; teachers covering a lot of grounds in a single class period, dissemination of large quantity of information to students in a short period of time, and non-use of any equipment and laboratory. In addition, the method enable provision of quality learning materials by the teacher, encourages self-discovery learning and develops, students listening and communication skills.

In spite the outlined advantages of L/DTM, it has several disadvantages, it shows no regard for individual differences among learners and does not provide opportunity for adequate class participation in the teaching and learning process. As a result, students learn comparatively little of what has been taught as they only hear and see the teacher. In most cases, the students are passive and boredom is easily associated with the method. Therefore, the continual use of L/DTM in Nigerian schools reduces the ability of students to grasp relevant concepts (Mba, 2012). It causes dissatisfaction, inadequate knowledge development, low interest and high dependency of

students on teachers. The consequence of this is that the students may not be able to retain their learning and to apply it to new situations.

In studying students' academic achievement and interest, gender cannot be ignored. Gender is an ascribed attribute that socially differentiate feminine from masculine. It connotes male and female or boys or girls in a given group of students. There is a general belief that boys are superior to girls in terms of cognition and logical reasoning as a result of certain factors and even superior in academic reasoning (Shaibu, & Mari, 2014). Chukwu (2012) disagreed with this claim and posited that difference in academic achievement between male and female students does not exist.

The CAI package if effectively utilized, it could revolutionize the classroom teaching and learning process. It will make it more collaborative, actives and interactive manner. It could as well improve students' academic achievement in difference trades. The perceived poor academic achievement may be eliminated. This assumption prompted the present study the effect of CAI on academic achievement and interest of auto-mechanics students in technical colleges

II. STATEMENT OF THE PROBLEM

The poor academic achievement of students in technical colleges in Nigeria has been a major concern to researchers. The use of effective instructional method in technical colleges will enhance students' academic achievement. This demands that teachers in technical colleges would adopt instructional methods that would improve the academic achievement of students in auto-mechanics technology in technical colleges. This demands that teachers in technical colleges would adopt instructional methods that would improve the academic achievement and interest of students in auto mechanics technology in technical colleges. To achieve this, various researchers have recommended that the lecture/demonstration instructional method could improve the achievement of students in technical colleges in Nigeria. In spite of the use of this method by teachers in technical colleges to ensure qualitative education at the technical colleges and bring about high quality products of students, there appears to be no improvement in the academic achievement of students in auto mechanic trade in technical colleges in Nigeria. The question now is, how students' academic achievement can be improved and problem of lack of interest addressed? This could be possible through a paradigm shift from L/DTM that are disconnected with the way students learn today to more appropriate teaching method that will cater for different learning styles and enhance inculcation of both technical and workplace skills in line with ICT-based learning. There is urgent need to bridge the existing gap between the teaching methods used at school and the ways students are getting information outside school through contact with computers, cell phones and internet to seen whether poor academic achievement is totally eliminated. Hence the need to investigate the effect of CAI on academic achievement and interest of auto-mechanics students in technical colleges.

PURPOSE OF THE STUDY

The purpose the study was to determine the effect of CAI on students' academic achievement and interest of auto-mechanics technology in technical colleges in Delta State. Specifically, the study sought to determine the:

- ✓ Mean academic achievement score of students taught auto-mechanics with CAI and those taught with L/DTM.
- ✓ Mean interest score of students taught auto-mechanics with CAI and those taught with L/DTM.
- ✓ Mean academic achievement score of male and female students taught auto-mechanics with CAI.
- ✓ Mean interest score of male and female students taught auto-mechanics with CAI.

RESEARCH QUESTIONS

The following research questions guided the study:

- ✓ What are the academic achievement scores of students taught auto-mechanics trade using CAI and those taught using L/DTM?
- ✓ What are the mean interest scores of students taught auto-mechanics trade using CAI and those taught using L/DTM?
- ✓ What are the academic achievement mean scores of male and female students taught auto-mechanics trade using CAI?
- ✓ What are the interest mean scores of male and female students taught auto-mechanics trade using CAI?

HYPOTHESES

The following null hypotheses were tested at 0.05 level of significance:

- ✓ There is no significant difference between the mean achievement scores of technical college students taught auto-mechanics with CAI and those taught using L/DTM.
- ✓ There is no significant difference between the mean interest scores of technical college students taught with CAI and those taught auto-mechanic with L/DTM.

III. METHOD

Quasi-experimental design was adopted for the study. Specifically, the pretest, posttest non-randomized control group design was adopted for the study. The design was adopted because it was not possible for the researchers to randomly sample the subject and assign them to groups without disrupting the academic programme and the time table of the technical colleges involved in the study. The study was conducted in technical colleges in Delta State which is located in the south-south zone of Nigeria. The population of the study was 128 year one National Technical Certificate (NTC) year 1 students. A sample size of 101 students was drawn from the four schools. Purposive sampling technique was based on availability of professionally qualified staff, computer facilities for teaching, regular electricity supply and willingness of regular teachers to participation as research assistance.

One intact class was used in each of the four schools giving a total of four intact classes. Simple random sampling was used to assign two intact classes to experimental groups and the other two intact classes to control groups. The groups for the study were coded group A and group B comprising one experimental class and one control class each. Experimental class (Group A) consisted of 37 students and control class (Group A) consisted of 39 students. Experimental class (Group B) consisted of 12 students and control class (Group B) consisted of 13 students.

The instruments for data collection were Auto-Mechanics Achievement Test (AMAT) and Auto-Mechanics Interest Inventory (AMII) adapted by the researcher from the NABTEB past examination questions between 2015, 2016 and 2017. AMAT contained 50 multiple choice test items with four options (A-D). AMII was based on five point Likert type scales of strongly Agree (SA), Agree (A), Undecided (U), Disagree (D) and Strongly Disagree (SD). The instruments were face and content validated by three experts; two in Technology and Vocational Department Education and one in Measurement and Evaluation, Education Foundation Department in Nnamidi Azikiwe University, Awka. The reliability of the instrument was established using test-retest method. Where copies were administered twice to 25 NTC year I auto-mechanics students drawn from government science and technical college Benin City, Edo State who were not part of the population. Reliability estimate method of test retest reliability using manual computation with the Pearson Product Moment correlation between the two sets of scores yielded a correlation coefficient value of 0.81. The estimate of internal consistency method was used for AMII with Cronbach Alpha and reliability coefficient valued of 0.85 was obtained.

The researchers sought and obtained permission from the authorities concerned for the involvement of their colleges and teachers in the study. There was availability of professionally qualified staff, computer facilities for teaching, regular electricity supply and willingness of regular teachers to participation as research assistance. The regular teachers were trained on how to conduct the experiment treatment using, laptop, auto-mechanics digital tutor, projector machine, projector screen, flash drive and remote control. Pre-test was administered to the two experimental groups after which the actual commenced on the second week. The primary focus of the teaching process was concentrated on automobile workshop, auto-maintenance, servicing/repairs, vehicle layout/chassis types, engine components/functions, single and multi-cylinder engines, four-stroke engines and valve operations mechanism. Each lesson lasted for 80 minutes and the treatment lasted for five weeks. At the end of the treatment, a post-test was administered on both groups using the AMAT and AMII and after a week interval. Data collected for the study were analyzed using mean scores and standard deviation to answer the research questions while Analysis of Covariance (ANCOVA) was used to test the hypotheses at 0.05 level of significance. Result of the pre-test and post-test were used for data analyses using Statistical Package for the Social Sciences (SPSS).

IV. RESULTS

Groups	Achievement Scores					
	No	Pretest		Post test		Mean Gain
		Mean	SD ₁	Mean	SD ₂	
Exp. Group	49	23.18	3.46	34.45	5.39	11.27
Contr. Group	52	22.79	3.46	32.33	10.63	9.54

*Exp Group=Experimental Group DI; Contr Group =Control Group

Table 1: Mean and Standard Deviation for Pre-test and Post-test Achievement Scores of Students

Table 1 show the experimental group had gain in mean of 11.27 which is higher than 9.54 gained by the control group. This indicate that the experimental group achieved more than the control group.

Groups	Interest Scores					
	No	Pretest		Post test		Mean Gain
		Mean	SD ₁	Mean	SD ₂	
Experiment. Group	49	114.98	13.53	144.33	14.16	29.35
Control Group.	52	117.67	10.81	109.83	10.86	-7.84

Table 2: Mean and Standard Deviation for Pre-test and Post-test Interest Scores of Students

Table 2 show the experimental group had gain in mean of 27.35 which is higher than -7.89 gained by the control group. The experimental group developed more interest while the control group had a loss in the posttest mean interest scores.

Groups	Gender					
	No	Pretest		Post test		Mean Gain
		Mean	SD	Mean	SD	
Males	79	4.34	35.50	1.66	6.39	31.16
Females	20	4.06	35.20	1.63	10.63	31.10

Table 3: Mean Pre-test and Post-test Mean Achievement Scores of Male and Female Students Taught Auto-mechanics Using CAI Package

Table 3 show the males had gain in mean of 31.16 which is higher than 31.10 gained by the by the females. The result show that the mean achievement scores of male and female students when exposed to experimental condition in favour of the male technical colleges students.

Groups	Gender					
	No	Pretest		Post test		Mean Gain
		Mean	SD ₁	Mean	SD ₂	
Males	79	114.98	13.53	141.84	16.16	26.86
Females	20	117.67	10.81	137.79	12.86	20.12

Table 4: Mean and Standard Deviation for Pre-test and Post-test Interest Scores of Male and Female Students Taught Auto-mechanics with CAI Package

Table 4 show the male had mean retention score of 41.84 which is higher than 37.79 gained by the female. The male therefore developed more interest than the female in the posttest mean retention scores.

Source	Type III Sum of Squares	Df	Mean Square	F	P-value.
Corrected Model	527.406 ^a	2	263.703	3.829	.025
Intercept	861.793	1	861.793	12.512	.001
Pretest achievement	413.802	1	413.802	6.008	.016
Level	89.686	1	89.686	1.302	.257
Error	6749.762	98	68.875		
Total	119655.000	101			
Corrected Total	7277.168	100			

a. R Squared = .072 (Adjusted R Squared = .054)

Table 5: ANCOVA Summary of Differences in Academic Achievement of Students Auto-mechanics Trade

Table 5 shows that the posttest mean academic achievement of students in the experimental and control groups $F(1, 100) = 1.302, p > 0.05$. This means that there was no significant difference in the mean achievement scores of students in experimental and control group. Therefore, the null hypothesis was accepted.

Source	Type III Sum of Squares	Df	Mean Square	F	P-value.
Corrected Model	30115.841 ^a	2	15057.920	94.978	.000
Intercept	15027.530	1	15027.530	94.787	.000
Pretest interest	89.227	1	89.227	.563	.455
Level	30019.939	1	30019.939	189.352	.000
Error	15536.991	98	158.541		
Total	1663525.000	101			
Corrected Total	45652.832	100			

a. R Squared = .660 (Adjusted R Squared = .653)

Table 6: ANCOVA Summary of Differences in Interest mean scores of Students Auto-mechanics Trade

Table 6 shows that the posttest interest mean score of students in the experimental group and the control groups $F(1, 100) = 189.352, p < 0.05$. This means that there was significant difference in the mean interest scores of students in experimental and control group. Therefore, the null hypothesis was rejected.

V. DISCUSSION

Findings of the study revealed that students taught auto mechanics using CAI achieved higher in their mean posttest scores than those taught using lecture/ demonstration teaching method. This finding is in agreement with that Mudasiru and Adedeji (2015) which reported that experimental group taught with to CAI either individual or cooperatively were better than their counter exposed to L/DTM.

Findings further showed that students taught auto-mechanics using CAI had high interest than those taught using lecture/demonstration teaching method. This finding agrees with that of Nwanne and Agommuoh (2017) and Ngwu (2015) which reported that students taught with CAI had higher mean interest scores than those taught using lecture/demonstration teaching method.

The study revealed that the mean achievement scores of male and female students when exposed to experimental condition is in favour of the male students. The findings

disagreed the finding of (Eze & Osuyi, 2018) that female students performed significantly better than their male counterpart in academic achievement in basic electricity in technical colleges.

The results also showed that the male auto-mechanics students developed greater interest in auto-mechanics trade than their female counterparts. On the other hand, the findings is in agreement with (Mustafa, Ashhan & Turgay, 2011) revealed that male students taught with CAI showed greater interest than their female counterparts.

Furthermore, the findings of the study revealed that there was no significant difference in the mean academic achievement and interest of male and female students in the experimental and control groups. This finding is in agreement with Chika (2010), Chukwu (2012) revealed that experiment group using CAI package achieved better than the control group.

VI. CONCLUSION

Based on the findings of this study, it was concluded that CAI positively affects students' academic accomplishment and stimulate interest in the subject auto-mechanics. It was found more compelling, effective, rewarding and valuable in teaching of auto mechanics at technical colleges' level.

VII. RECOMMENDATIONS

Based on the findings of this study, the following recommendations were made:

- ✓ The use of ICT for teaching and learning in technical education should be encouraged by stakeholders. Computer instruction and application of modern technology should therefore be made compulsory for teachers and students at all levels of our educational systems but most especially in the technical education. To achieve this, curriculum planners must enforce the inclusion of the use of ICT and computer education and training in school curricula.
- ✓ Educators should continue to place more emphasis technical education and implement educational technology as a means of enhancing the quality of education.
- ✓ In-service training workshops for professional development on educational technologies should be organized for teachers, particularly on the production and use of computerized instructional materials. Technical education student-teachers must receive in-service training that will render them relevant to today's knowledge age.
- ✓ Schools should be equipped with computer and internet facilities and other necessary instructional tools like slide, video presentations simulator, demonstrator and auto scan tools. It is necessary that teacher trainers must also be trained so that they are able to impart ICT training to student teachers in the technical education system.

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