Effect of Computer-Based Instruction on Students' Achievement and Retention of High and Low Achieving 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. It is believed that the use of effective instructional method in technical colleges will enhance students' achievement. This demands that teachers in technical colleges would adopt instructional methods that would improve the students' achievement in auto-mechanics in technical colleges. The study therefore, investigated the effect of computer-based instruction on students' cognitive achievement and retention of high and low achieving 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 trade 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. The researchers developed CBI package (Auto-mechanics Tutor) which was used as treatment for experimental group while control group were exposed to lecture/demonstration teaching method. Instrument for data collection was Auto-mechanics Achievement Test (AMAT). 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. 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 CBI achieved significantly higher grades and retained better than those taught using L/DTM. There is no significant difference in achievement test score among high, average, and low IQ students through CBI approach over L/DTM. Based on the findings of the study, it was concluded that CBI positively affects students' cognitive achievement and retention ability of high and low achievers in the subject auto-mechanics. CBI was found more compelling, effective, rewarding and valuable in teaching of auto mechanics at technical colleges' level. Consequently, it was recommended that teachers should ensure constant and effective utilization of CBI for instruction in auto-mechanics in technical colleges to enhance achievement and retention ability of students. Also, school administration should provide opportunities for in–service training programmes for auto mechanics teachers in order to equip them with competencies needed in the use of CAI for instruction.
Keywords: *Computer-Based Instruction, Achievement, Retention, Auto-Mechanics Technology and Technical Colleges.*

Introduction

The world is becoming more sophisticated technologically as the industrial age has given way to an information age. An information technology era has brought positive changes to the society relative to business, education and other facets of human life. In fact, the education sector benefits

enormously by participating in an information-rich computerized society. To keep up with the emerging technological changes at the regional, national and global environments, education system in Nigeria is continuously upgrading its resources through the modernization of its various elements of the system. Modernization can be possible through the adoption of modern instructional aides and equipment such as multimedia gadgets like laptops, projector machines, white screen board, CD-ROM, TV, internet among other Chang (2000) in Yusuf (2009). The advent of digital technology which had been widely embraced by students outside school, but not applied in the classroom teaching and learning process in Nigeria technical colleges.

Technical colleges is a specialized institution of learning where trades and modular courses are offered in addition to general education and science subjects. Umunadi, (2013) emphasized that the main objectives of technical college education is to make students familiar with most import ant branches of production in industry, commerce, imparting of skills and practical competencies in the handling of tools, materials and generally equipping the students with both theoretical knowledge and work habits. Technical colleges provide the youth with vocational competencies needed in various disciplines required in the world of work. It also provide technical and vocational training for quite a number of occupations including wood work, metalwork, mechanical engineering craft practice, electrical installation, radio and television work, refrigeration, carpentry and joinery, furniture making, bakery, metal fabrication, tailoring, dress making typing, shorthand, accounts, spinning, weaving, dyeing and bleaching, vocation, carpentry and joinery, furniture making, bakery, metal fabrication, vocational agriculture, agricultural machine work and home economics (Olaitan, 1996). The duration of training is three years, leading to the award of National Technical certificate. Also available in some technical colleges are advance course leading to the award of Advanced National Technical Certificate (ANTC) or Advanced National Business Certificate (ANBC) in the various field of study (NBTE, 2003). Thus, knowledge acquired from these technical trade could help the graduates to secure gainfully employment automobile industry.

Auto-mechanics technology is one of the mechanical trade subjects offered under motor vehicle mechanic works in Nigerian Technical Colleges (Federal Republic of Nigeria, FRN, 2013). Auto-mechanics trade programme in technical colleges involves the application of scientific knowledge in the design, selection of materials, construction, operation, maintenance and repair of automobiles (Audu, Azlan & Muhammad, 2014). It is a skill-oriented subject taught with emphasis on theory and practice. An auto mechanics may be knowledgeable in working on all parts of a variety of cars, or may specialize either in a specific skill area of automobile or on a specific model or brand of car. His job includes accurate diagnosis of car problems and repair (US Occupational Handbook, 2011-2012). This trade involves the application of scientific knowledge in the design, selection of materials, construction, operation and maintenance of automobile devices (Nigerian Educational Research and Development Council (NERDC, 2007). The programme is aimed at producing craftsmen who would be able to test, diagnose, service, refurbish and completely repair any fault relating to the automobiles to the manufacturers' specifications. Hence, motor vehicle mechanics curriculum used in technical colleges is designed to offer general education subjects in addition to occupational trade components which invariably expose learners to basic theories, workshop practices, industrial training components and small business management as well as entrepreneurial training (FRN, 2013); Okoye

and Okoye, (2015). To this end, the curriculum was configured to impart in learners specialized knowledge and requisite competencies to enhance their creative acumen and employment opportunities, which would in turn result in socio-economic and technological development of the country.

The attainment of technological development is quite a challenging especially now that technology is digitally driven at an unprecedented speed. Evidently, motor vehicle industry is in the frontier of technological dynamism which promotes competitiveness and innovative exploits which add value to human existence. Such innovations include: manufacturing of high speed cars with high fuel economy, invention of hybrid cars which defiles the primacy of hydrocarbon gas with its attendant destructive effects to the green house (ozone layer); the installations of sensory devices which make it possible for someone, with the aid of a remote control, to operate the car from a distance and also track and recover a stolen vehicle among other innovations. These innovations do not only make the industry highly competitive but also demand effective training and development of competent craftsmen and allied professionals who would apply their practical skills to meet the yearning demands of technological changes.

Automobile repairs in   Nigeria is suffering from the hand of incompetent road side mechanics. .Majority of the road side auto-mechanics lack the requisite skill to repair already diagnosed faults in cars. In attempt to carry out repairs, they create more problems or even render the car perpetually irreparable. Most cases often resort to trial and error approach in order to correct the fault, which usually does not conform to manufactures' specifications. The practice has thrived because auto-mechanics graduates seems to lack the needed competencies to perform the expected roles in the automobile workshop. Nevertheless, out of all the factors attributed to this scenario, teachers' teaching methods appeared the most liable factor, and therefore calls for adoption of appropriate method of teaching in auto-mechanics to enable learners acquire workplace competencies in order achieve excellent results and thus perform well in the industry. Sequel to this, Royles (2013) and Motibodhi (2014) affirmed that technical education teachers should be adequately trained to be able to inculcate in students, scientific knowledge and workplace basic skills, such as learning to learn, technical and interpersonal/communication skills, higher order thinking skills, problem-solving, creative thinking and ability to work in teams. The failure of technical education graduates to possess the requisite practical skills could be ascribed to the following factors, namely lack of adequate teaching facilities, absence of qualified teachers, students' negative attitudes towards their studies, poor funding and inappropriate teaching methods; which summarily resulted in poor academic performance of students especially in auto-mechanics.

To make the concepts of auto-mechanics subject more fascinating and compelling, it becomes imperative to employ 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. Thus, a person who is indigenous to the digital world, has grown up with and uses a wide variety of available and continually evolving technology with an inborn, instinctive sense of how to communicate, record, understand and share in society. 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' children are being taught by immigrants who are, in effect, not of the same language. In this instance, the usage of computers in the classrooms has become inevitable and the ratio of the usage of computer-based technology instruction has been on the increase.

Computer-Based Instruction (CBI) 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 and it allows each students to one computer terminal (Adedoja, & Fakokunde, 2015).. The instructions are also programmed in a computer disc, 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. This encourages interactivity, which individualizes content for each learner based on their needs and it provides formative feedback to multiple choice questions Bayrak and Bayram, (2010). CBI 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 (Akcy, Durmaz, Tuysuz, & Feyzioglu, 2006).. 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, CBI may act as a facilitator of dynamic learning and higher order thinking.

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 and Turgay (2011) there is a lot of established findings on the instructional value of computer, particularly in advanced countries. There are now several CBI packages on different subjects. It is clear that current trend in research all over the world is the use of computer facilities and resources to enhance students' learning. Chang (2000) in Yusuf (2009) opined that many exercises that depart from traditional method are now readily accessible on the web, even though teachers do not use these facilities. The increasing importance of skilled persons not only as users of knowledge but producers of knowledge puts additional responsibilities on technical teachers to incorporates CBI to improve achievement of students

Cognitive achievement may be defined as a mental capability that involves the ability to reason, plan, solve problems, think abstractly, comprehend complex ideas, learn quickly and learn from experience (Robinson, 2005) Cognitive abilities are aspects of mental functioning, such as memorizing, remembering, focusing attention, speed of information processing, spatial and causal reasoning (Dehn, 2008). Cognitive achievement are brain-based skills needed to carry out any task from the simplest to the most complex. Individual differences between people are measured by comparing scores on tests of these mental abilities. Also, cognitive achievement connotes attainment in a school subject as symbolized by a score or mark on a test (Okoro, 2002). Antherson (2003) contended that cognitive achievement is dependent upon several factors among which are the instructional methods, learning environment and the learner. Additionally, it is measures of aptitudes

for learning in specific instructional domains are based on a narrower sampling of the domain-relevant abilities. Furthermore, cognitive achievement of students in this context is perceived as the learning outcome of students in auto-mechanics showing the extent of mastery on the subject matter. Hunk, Wanderley and Kirk (2000) and Anene (2005) contend that achievement is quantified by a measure of student's academic standing in relation to those of other student tested with the same instrument.

There are students with different cognitive ability levels, which are categorized as low, medium and high ability levels. Students with marks from 0% to 39% are low-level ability; those with 40% to 69% are middle-level ability and those with 70% and above are high-level ability (Oyenuga, 2010). According to Ashilley (2001), low level ability students are said to be the group of students who perform poorly in tests and examinations, are easily distracted, less able to set about tasks in an organized manner and less able to control their own basic impulses and their destines. Oyenuga (2010) also described the low-level ability students as students whose academic potentials are judged below class average while their achievement is described as poor. On the other hand, the high-level ability students were referred as those students who did not ascribe their fate to luck or to vagaries of chance but rather to their own personal decisions and efforts. Oyenuga (2010) further stressed that the high-level ability students as whose educational potentials are above class average and their achievement described as good. Since it is presumed that the purpose of CBI is to assist learning, it is equally important to determine its ability to enforce learning retention (that is, the transfer of learning and/or retention of learning).

Retention of learning is simply the ability to remember what has been learnt. Eze, Ezenwafor and Obidile, (2016) stated that retention is the ability to retain the knowledge of what is learnt and to be able to recall it when it is required. Retention scores indicate the percentage or degree of originally learned skill that is remembered or recalled as a function of elapse time. Retention is usually measured in collaboration with academic achievement. It is therefore seen as the achievement on a subject after a certain period of time. Retention helps in knowledge development. Knowledge development can be guaranteed when effective teaching methods are used in the teaching and learning process. Ozden and Gultekin, (2008) contented that the use of appropriate instructional methods could enhance students' retention, which could in turn improve the academic achievement of students. The assumptions is that when effective method is employed for instruction, students internalize what has been taught in order to correctly and successfully apply the concepts learnt at a later date. The predominantly teaching method mostly used in technical colleges is lecture/demonstration teaching method.

Lecture/demonstration teaching method (L/DTM) is the teacher-centered method, which 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 L/DTM as notes–giving, notes taking, and chalkboard illustrations in the classroom. 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 without 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.

Despite the outlined benefits of L/DTM, it has several shortcomings, 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 monotony is easily associated with the method. Therefore, the tenacious 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.

However, Nigerian governments invest hugely on technical colleges programme with the aim of improving the image and performance of technical college students. Yet, the performance of the students in auto-mechanics has never been encouraging in Niger state. NABTEB chief examiner's report indicated that the failure rate in auto mechanics in the years 2011 and 2012 were due to poor instruction techniques and lack of students exposure to practical or media instruction (NABTEB, 2011 & 2012). Moreover, it has been discovered that the persistent poor academic achievement as well as retention in auto-mechanics and other technical subjects is as a result of the inappropriate teaching methods adopted by teachers (Ogbuanya & Owodunni, 2013). Therefore, to be effective in the 21st century classroom, technical teachers need to embed digital technologies in all their pedagogical practices

The CBI package, if successfully integrated into teaching and learning process especially auto-mechanics technology, it may perhaps revolutionize the classroom environment making more collaborative, active, and interactive manner. This could curb or totally eliminate perceived poor cognitive achievement and low retention among the students. This assumption prompted the present study, the effect of CBI on cognitive achievement and retention of high and low achieving auto-mechanics students in technical colleges

Statement of the Problem

Today, educators are facing the challenge of instructional paradigm shift in public technical colleges in Nigeria. Parents and the general public have criticized the public technical colleges and classroom environments, that they are not ready to meet learner's needs and the demands of the industrial society in this 21st century information society. Some complain about current educational practices, raising questions about the inability of Nigerian students to perform creative thinking as well as problem solving tasks when compared to other advanced countries. In the same vein, the influence of technology has rendered traditional skills inadequate for the world of work. In the automobile industry there have been complex changes in the systems and components of automobiles that are imported or assembled in Nigeria. The new development has greatly brought about changes in the skills required of auto-mechanics craftsmen for gainful employment. However, most of these new improvement in automobile components and systems are not reflected in the learning contents of the training of auto-mechanics students in Nigeria technical colleges. Invariably, there is a

mismatch of motor vehicle mechanics works contents and the skills required for profitable employment in the automobile industry.

Additionally, technical college graduates upon graduation are supposed to have three options. These options according to the National Policy on Education (FGN, 2004) is to either secure employment in the industries, pursue further education in advance craft in a higher technical institutions or set up their own business and become self-employed. Unfortunately, this seems not to be yielding the desired result in auto-mechanics trade in technical colleges. 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. To achieve this, various researchers have recommended that the L-DTM could improve the achievement of students in technical colleges in Nigeria. Despite 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 seems to be no improvement in the academic achievement of students in auto mechanics trade in technical colleges in Nigeria. The question now is, how would students' academic achievement could be improved and problem of retention 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 technical and workplace skills. 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, IPad, internet, face book, websites learning, cell phones and other technological devices. The continual use of L/DTM might have contributed to the persistent high failure rate among technical college students especially in auto mechanics trade. Therefore; could this problem of persistent poor achievement among auto-mechanics students in technical colleges be enhanced by the use of computer based instruction (CBI)?

Purpose of the Study

The purpose of the study was to determine the effect of CBI on students' achievement and retention of high and low-achieving of auto-mechanics technology in technical colleges in Delta State. Specifically, the study determined the:

1. Mean achievement scores of high achieving students taught auto-mechanics with CBI and those taught with L/DTM.
2. Mean retention scores of low achieving students taught auto-mechanics with CBI and those taught with L/DTM.
3. Mean achievement scores of high and low achieving students taught auto-mechanics with CBI.
4. Mean retention scores of high and low-achieving students taught auto-mechanics with CBI.

Research Questions

The following research questions guided the study:

1. What are the mean achievement scores of high-achieving   students taught auto-mechanics using CBI and those taught using   L/DTM?

2. What are the mean retention scores of low-achieving students taught auto-mechanics trade using CBI and those taught using L/DTM?

3. What are the mean achievement scores of high and low-achieving students taught auto-mechanics trade using CBI.

4. What are the mean retention scores of high and low- achieving students taught auto-mechanics trade using CBI.

Hypotheses

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

1. There is no significant difference between the pre-test and post-test mean achievement scores of low and high achieving students taught auto-mechanics with CBI in technical colleges.

2. There is no significant difference between the pre-test and post-test mean retention scores of low and high achieving students' taught auto-mechanics with CBI in technical colleges.

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) 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 high achievers consisted of 29 students and control group low achievers consisted of 27 students and low achiever experimental is 20 and high achievers control group 25 students.

The instruments for data collection were Auto-Mechanics Achievement Test (AMAT) adapted by the researchers' from the NABTEB past examination questions between 2015 and 2018. AMAT contained 50 multiple choice test items with four options (A-D). The CBI was developed by the researchers with the assistance of a professional programmed developer. The CAI package, AMAT lesson plan were validated by experts. A panel of three experts from Technology and Vocational Education and Computer Science Department from Nnamdi Azikiwe University, Awka, Anambra State. They considered the audibility, simplicity of the package as well as its suitability for the level of the subject. They verified the extent to which the items of each unit were considered to testing the topic they were meant to test and check the possible errors and suggested answers. Base on the comments, corrections and advise of the experts, the original package was edited by the researcher for the final draft. The package, thus validated was used for the study. The reliability of the instrument was established using test-retest method. The copies of the instrument were administered twice to the Auto-mechanics students drawn from government science and technical college Benin City, Edo

State who were not part of the population studied. 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 was obtained.

Experimental Procedure

The researchers' sought and obtained permission from the authorities concerned for the involvement and participation of their students and teachers in the study. The study lasted for eight weeks. In the first week, the researchers visited the schools for briefing/orientation for the participating teachers involved (research assistants) and they were trained on the method to be used before the commencement of the experiment.   Teachers of the control group were instructed to use lecture-demonstration teaching method, while the teachers of the experimental group was told to use, computer tutorial (auto-mechanics CD plate), laptops, projector machine, projector screen and on-board diagnoses (OBD2) for teaching. Likewise, students of experimental groups were given training in how to maneuver computer, writing assignments, use of internet and software, sending, receiving and replying through emails and website learning. For each student in experimental group, email addresses were created and they were told to share their emails addresses with their teachers and class colleagues. The pretest was administered with the help of research assistants (the class teachers) to determine the initial abilities of the students prior to the experiment.

In the second week, the teaching commenced and ended on the fifth week. The primary focus of the teaching process was concentrated on automobile workshop, auto diagnoses, maintenance, servicing / repairs, vehicle layout, engine components/functions, single and multi-cylinder engines, two and four-stroke engines and valve operations mechanism. Each lesson lasted for 80 minutes and the treatment lasted for five weeks. The teaching was conducted during the normal school period using the school time table. At the end of the treatment, the sixth week, a posttest was administered to both groups using AMAT by the class teachers. The exercise provided a posttest data for each of the dependent variables.

In the eight week, the AMAT was re-administered by regular classroom teachers as delayed retention posttest after two weeks interval to ascertain their retention level, but the original test reshuffled. The experimental group wrote the examination using the computers. The scoring of the examination and displaying of results was done instantly by the computers. The control group wrote the examination conventionally and the research assistants supervised the examination, marked the scripts, recorded the marks and made the scores available to the students.

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. In the test of null hypotheses using ANCOVA, when the p-value was less or equal to the level of significance (0.05), the null hypothesis was rejected. Also, when the p-value was greater than the level of significance (0.05), the null hypothesis was not rejected. The pre-test and post-test scores were used for data analyses using Statistical Package for the Social Sciences (SPSS).

Results
Table 1

Pretest and Post-test Mean Achievement Scores of high achieving students taught auto-mechanics trade using CBI and those taught using L/DTM

Groups		Scores of high achieving students				
		Pretest		**Post test**		
	No	**Mean**	**S/D**	**Mean**	**S/D**	**Gain in mean**
Exp Group	29	24.69	2.49	35.53	5.37	10.84
Contr Group.	27	23.84	2.91	33.33	11.55	9.50

Table 4 shows that the posttest mean score of experimental group is 35.53 is higher than posttest mean score is 33.33. There is a slight difference in the mean of 2.20 in favour of high achieving students.

Table 2

Mean Retention Scores of Low Achieving Students Taught Auto-mechanics trade with CBI and those Taught using L/DTM

Groups		Retention		
	No	**Posttest Mean**	**Stand dev.**	**Gain in Mean**
Low Achievers (CAI)	20	41.8	3,69	4.24
Low Achievers (L/DTM)	27	37.45	4,79	

* D/M –Difference in Mean

Table 2 shows that the mean retention score of experimental group is 41.69 and the control group is 37.45 with a difference of 4.24 in favour of the low achievers taught with CBI had better retention than low achievers taught with L/DTM.

Table 3

Mean Achievement Scores of High and Low Achieving Students Auto-mechanics taught with CBI

Groups		Scores of High and Low Achieving Students				
		Pretest		**Post test**		
	No	**Mean**	**S/D**	**Mean**	**S/D**	**Gain in mean**
High Achievers (CAI)	29	24.69	2.49	35.53	5.35	10.84
Low Achievers (CAI)	20	23.83	2.19	33.33	11.55	10.50

Table 3 shows that mean cognitive achievement scores of experimental group of high achievers posttest is 35.53 while that of the control group low achievers mean posttest scores is 33.33. The gain in mean of high achievers is 10.84 and 10.50 for low achievers taught with CBI.

Table 4

Mean Retention Scores of High and Low Students Taught Auto-mechanics with CBI

Groups	No	Retention	
		Posttest Mean	**SD**
High achievers	29	41.84	4.069
Low achievers	27	37.79	4.999

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

Table 4 shows the posttest mean retention scores of high achievers is (M=41.84) and low achiever is (M=37.79). This implies that the high achievers retained better than the low achievers in the treatment. It implies that the use of CBI positively enhanced the retention ability of both the high and low achievers respectively.

Table 5

ANCOVA for Differences in mean Cognitive Achievement scores of high and low achieving Students taught in Auto-mechanics with CBI

Source	Type III Sum of Squares	Df	Mean Square	F	P-value.
Corrected Model	470.062[a]	2	235.031	3.384	.038
Intercept	719.144	1	719.144	10.353	002
Pretest achievement	155.618	1	155.618	2.240	.138
Achievers	32.342	1	32.342	466	497
Error	6807.107	46	69.460		
Total	119655.000	49			
Corrected Total	7277.168	48			

a. R Squared = .065 (Adjusted R Squared = .046)

Table 5 shows that the posttest mean cognitive achievement of high and low achieving students in the experimental is $F(1, 100) = 0.497, p> 0.05$. This means that there was no significant difference in the mean achievement scores of high and low achieving students in experimental group. Therefore, the null hypothesis was rejected.

Table 6

ANCOVA Summary for Differences in Mean Retention Scores of High and Low-achieving Students taught Auto-mechanics Trade with CBI

Source	Type III Sum of Squares	Df	Mean Square	F	P-value.
Corrected Model	698.637[a]	2	349.319	.762	.470
Intercept	20454.174	1	20454.174	44.590	.000
Pretest interest	91.271	1	91.271	.199	.657
Achievers	602.735	1	602.735	1.314	.254
Error	44954.195	46	458.716		
Total	1663525.000	49			
Corrected Total	45652.832	48			

a. R Squared = .015 (Adjusted R Squared = -.005)

Table 5 shows that the posttest mean retention scores of high and low achieving students in the experimental is $F(1, 100) = 0.254$, $p > 0.05$. This means that there was no significant difference in the mean retention scores of high and low achieving students in experimental. Therefore, the null hypothesis was rejected.

Discussion

Findings of the study revealed that high achievers had higher mean academic achievement in both experimental and control groups in the posttest while high achievers in experimental group gained more than high achievers in the control group. The finding is in agreement with that of Nwosu (2009), Bayrak and Bayram, (2010) which reported that expeimental group taught with CBI achieved better then the control group taught with L/DTM.

Finding further showed that the high achievers in the experimental group had the higher mean retention score than those in the control group. This finding agrees with that of Okoro (2009) and Okoye (2018) which reported that higher achiever taught with CBI perfomed better than the high achievers in the taught with L/DTM.

The study revealed that high achievers in the experimental group had higher mean gain than academic achievement than high achievers in the control group. Also low achievers in the experimental group gained more than low achievers in the control group. This finding supports the findings of Ahassan, Ezenwa and Danteni (2013) that high and low achievers in the experimental group achieved better than their conterparts in the control group

The results showed that both achievers in the experimental group had greater retention scores than those in the control group. This result is in agreement with the findings of Nwanne and Agommuoh (2017) which reported that the mean retention scores of students taught with CBI achieved more than those taught with L/DTM.

Furthermore, findings of the study revealed that there was no significant difference in the mean academic achievement scores of high and low achieving students in the experimental and control groups. This finding disagrees with Oyenuga (2016) which found a significant difference

between mean retention scores of students taught with computer simulation technique and those taught with L/DMT in favour of the experimental group.

Conclusion .

Based on the findings of this study. It could therefore be concluded that CBI is not only an innovative teaching method, but could also enable teachers effectively deliver their lessons to enable students assimilate the instruction in order to enhance their cognitive achievement in auto-mechanics in technical colleges. Also, the findings revealed an appreciable improvement in the performance of students taught auto-mechanics using computer-assisted gadgets as well as the comparison between the achievement of high and low-achievers.

Recommendations

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

1. Teachers should ensure constant and effective utilization of CBI for instruction in trade and trade related subjects/courses in technical colleges, secondary and vocational schools to enhance achievement and retention ability of students
2. School administration should provide opportunities for in–service training programmes for auto mechanics trade teachers in order to equip them with competencies needed in the use of CBI for instruction.
3. Curriculum planners should formally adopt CBI for instruction in auto-mechanics trade in technical colleges and ensure its wide application.
4. Government should provide (technical colleges, secondary and vocational schools) with computers and internet facilities to enable students maximize the benefits of CBI.

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