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EFFECTIVENESS OF COMPUTER TUTORIAL MODEL, DRILL AND PRACTICE ON STUDENTS' ACHIEVEMENT AND RETENTION IN FABRICATION AND WELDING TECHNOLOGY IN TECHNICAL COLLEGES

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Abstract:
The study determined the effectiveness of computer tutorial model, drill and practice on students' achievement and retention of students of fabrication and welding technology in technical colleges in Delta State. Two 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 136 National Technical Certificate (NTC) year 2 fabrication and welding 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 Fabrication and Welding Achievement Test (FWAT). The instrument was face and content validated by three experts. Test–retest method was used to establish its reliability of FWAT and was calculated using Pearson product moment correlation which yielded a correlation coefficient value of 0.87. Treatment procedure of computer tutorial model, drill and practice instructional strategy and Lecture-demonstration teaching method 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. The students in the experimental group obtained higher mean scores than in the control group in cognitive achievement as well as in cognitive and psychomotor retention. There was a significant difference between the mean scores of experimental

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group and control group in the cognitive achievement and psychomotor retention of students in fabrication and welding in technical college. In view of the positive effects of computer tutorial, drill and practice it was recommended among others, that the method should be adopted to teaching fabrication and welding technology in order to enhance students' cognitive achievement and psychomotor retention. Also, the school administration should provide opportunities for in-service training and provide computers for fabrication and welding technology teachers and students to enable them acquire competencies needed in the use of modern technology instructional approach for teaching and learning fabrication and welding in technical colleges.

Keywords: computer tutoring model, drill and practice, achievement, retention, fabrication and welding technology and technical colleges

1. Introduction

Technical colleges are the institutions where students are trained to acquire relevant knowledge and skills in different occupations for employment in the world of work (NBTE, 2013). According to Federal Republic of Nigeria (FRN, 2013), technical college is a segment of Technical and Vocational Education (TVE) designed to produce craftsmen at the secondary school level and master craftsmen at the advanced craft. The goals of technical colleges are to provide trained manpower in the applied sciences, technology and business particularly at craft, advanced craft and technician levels; provide the technical knowledge and vocational skills necessary for agricultural, commercial and economic development; and give training and impart the necessary skill to individual who shall be self-reliant economically (FRN, 2013). Technical colleges are regarded as the principal vocational institution in Nigeria (Okoro, 2019). According to Umunadi (2019), technical colleges are principal vocational institutions in Nigeria which are designed to prepare the individuals to acquire practical skills, knowledge, and attitude at sub-professional level, primarily established to train craftsmen in various occupations. Technical colleges are, therefore, schools or training institutions where trade or trades are taught. Technical colleges offer the following programmes; block laying, bricklaying and concreting; carpentry and joinery; electrical/electronic; automobile, metalwork and fabrication and welding technology

Fabrication and welding technology is a skill based programme designed to equip the trainees with knowledge, attitude and skills to carry out sheet metal work, gas welding, arc welding and cutting jobs on all types of metals and produce simple finished structural steel work projects (National Board for Technical Education (NBTE), 2001). NBTE accredits the programmes in the Technical Colleges while the National Business and Technical Education Board (NABTEB) conducts the final national examination and awards certificates. Trainees who successfully complete all the courses/modules specified in the curriculum table and passed the national examinations in the trade are awarded National Technical Certificate (NTC) at craft level and Advanced National Technical

Certificate (ANTC) at advanced craft level. The major goal of the programme in the technical colleges is to produce competent craftsmen and master craftsmen for industrial and technological development in Nigeria. However, besides the general unemployment situation in Nigeria, chief examiner's report of NABTEB examination conducted in the technical colleges in November/December 2012 revealed that candidates recorded poor performance in fabrication and welding technology (NABTEB, 2012). This high failure rate of technical colleges' students in the final NABTEB examination is persistent and is gradually increasing every year (Ogundola, Popoola & Oke, 2010). This deficiency has been demonstrated by the failure of some technical college products to secure employment. Invariably, many of the technical colleges' graduates who could not pass the final NABTEB examination are unemployed, committing crimes and all sorts of atrocities in the country. According to Kilishi, Mobolaji, Usman, Yakubu, and Yaru (2014), people blame the rising level of crime in the country on the mass unemployment of youth.

One of the reason for continual persistent poor performance of technical colleges' students in the final NABTEB examination has been poor teaching arising from the use of traditional teaching methods such as lecture and demonstration to implement the curriculum (Owoso, 2012; Oranu, 2003). Traditional teaching methods such as lecture and demonstration methods are teacher-centered and placed emphasis on knowledge transmission from the teacher to passive students and encourage rote learning. Technological developments have resulted into big gap between teaching at schools and the ways students get information in the 21st century. Nowadays visual materials are used in all human endeavour, and students are under the effect of technological tools such as television, iPad, Android phones and computers. Hence, when teaching and learning at schools are supported through various sounds, visuals and animations, more permanent, fun and productive learning takes place (Ercan, Bilen & Bulut, 2014). Perhaps, if technical colleges' students are taught fabrication and welding technology with computer-based instruction, the students' interest and achievement may likely improved.

To make the concepts of fabrication and welding technology subject more concrete and real world situation, 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. 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. It becomes obvious for technical teachers to radically re-structure the classroom learning environment in a way to incorporate computer-based technology instruction. However it is believed that effective technical teacher who exposes students on the use of tools and equipment in the workshop will not only ability to remember effectively but will be able to perform the practical aspect successfully using instructional materials and technology teaching method like computer-assisted instruction.

Computer-Assisted Instruction (CAI) or Computer Aided Instruction (CAI) refers to use of computer as a tool in teaching and learning. Computer assisted instruction according to Rabia (2004) is an interactive instructional technique whereby a computer is used to present the instructional material and monitor the learning that takes place. In a computer assisted instruction the students give immediate feedback from the computer and maintain some degree of control (Okundaye, 2005). Some of the computer assisted instruction methods include simulation, problem solving, games, tutorial, drill and practice.

Computer tutorial model contains an organized body of knowledge or one or more pathways through the knowledge, specific learning objectives, and built-in tests of the learner's performance. CAI tutorial have advantages of questions, adjusting content presentation order according to the learner's responses to the questions, dynamism of presentation and record keeping. Tutorial provides generally new information to the students in much the same manner as a human teacher or tutor might. According to Adedokun (2004), CAI tutorial are based on the principles of programmed learning or instruction. Instructional activities are presented either in linear or branching method which uses hyperlink for videos and, graphs. CAI tutorial gives immediate feedback, create proficiency in computer usage, and gives students a sense of control over learning, calls for using sight, hearing and touch (Kaur, 2013).

Drill and practice application are designed to help learners master already introduced skill or knowledge through repetitive work. For instance, the computer could present an exercise to which the learner is required to type in a response. Drill and practice involve a sequence of tasks, exercises, or words repeated over and over until they can be performed faultlessly. In a CAI drill and practice design, the computer screen presents the student with questions to respond to or problems to solve, the student responds, the computer informs the student whether the answer is correct and if the student is right, he or she is given another problem to solve, but if the student responds with a wrong answer, he or she is corrected by the computer (Mudasiru and Adedeji, 2010).

Computer tutorial model, drill and practice are interactive and help students remember the concepts they have been taught previously (Lesteri, 2015). The computer tutorial when used in combination with drill and practice provides instruction in such a way that each tutorial lesson has a series of frame or branches. The frame or branch poses questions to students at the end of each lesson. Student answers questions about the lesson and gets immediate feedback. On each answer, if the student answers correctly, he will be told to proceed to the next frame but if the response of the student is wrong, the package will take him or her back to the frame where the answer could be found or on the alternative gives the correct answer to the student before proceeding to a new frame. The student has to respond to every framed questions in the exact order presented and there is no deviation from this presentation but the student does have the freedom to work through the material at his or her own pace (Mudasiru and Adedeji, 2010). In addition, the use of computer tutorial, drill and practice for instruction have several

benefits. These include self-paced learning, self-directed learning, the exercising of various senses and the ability to represent content in a variety of media. With self-paced learning, learners can move as slowly or as quickly as they like through a programme. The fact that the computer can exercise various senses and present information in a variety of media can enhance the learning process. computer assisted instruction encourage learning as it enhances students' interaction with the learning environment which in turn help sustain students' interest in learning and consequently improve students' achievement.

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. In teaching and learning situations, academic achievement is synonymous with academic performance. They could be seen as the outcome of students' effort in examinations. Eze, Ezenwafor and Molokwu (2015) posited that academic achievement is used to measure student's success in educational institutions or how well students meet standard set out by examining bodies or the institution. Eze, Ezenwafor and Obidile (2016) contended that a 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. Olori, and Igbosanu (2016) posited that instructional method used by teachers, could challenge students to work at higher intellectual level that would improve their academic achievement and retention of learning.

Retention is viewed as the ability to remember or recall what is taught at the time it is needed. Retention, according to Safo, Ezenwa and Wushishi (2013), is the ability to keep or retain the knowledge of what is learnt and to be able to recall it when it is required. The ability to remember and apply concept learnt on the later day is referred to as retention (Eze, Ezenwafor and Obidile, 2016). For instance, if a group of students are exposed to classroom instruction on a particular subject after which a test is given, such test only reveals the extent of the content of that subject learnt by the students. If another test is given (say two weeks or more) after the instruction, one can infer from the result of the test how much of the content of the instruction the students retained (Mustafa, Ashhan, & Turgay, 2011). Retention helps in knowledge development. Knowledge development could be guaranteed when effective methods of teaching are used in the teaching and learning process. The assumption is that when effective method is employed for instruction, it aids students to internalize what has been taught in order to correctly and successfully apply the concepts learnt at a later date in metal work technology.

Lecture-demonstration teaching method 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 lecture-demonstration

teaching method 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. Despite the outlined advantages of lecture-demonstration method, 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 lecture-demonstration teaching method 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. Therefore, to be effective in the 21st century classroom, technical teachers need to embed digital technologies in all their pedagogical practices especially fabrication and welding technology.

Teaching and learning of technical subjects especially fabrication and welding technology continue to suffer as a result of over dependence on lecture-demonstration teaching method alone. It is essential technical education teachers devise alternative method by which knowledge and skills could be imparted to learners taking the advantage of modern technology. This assumption prompted the present study, the effectiveness of computer tutorial, model and drill on students' achievement and retention in fabrication and welding technology in technical colleges in Delta State.

2. Statement of the Problem

The world we live in has fundamentally changed. Our students have moved into the information age. The learning styles of today's digital children are significantly different than those for whom our schools were originally designed. Todays' students work, think, and learn differently and our schools and instruction primarily based on teachers talking in classrooms, textbooks, memorization and content-based tests, are becoming increasingly out of sync with the world around them. Likewise, with the advancement in fabrication and welding technology, computerization and digitalization, various methods of instruction have been devised and used in the teaching and learning process to overcome most instructional problems in developed countries. As such, acquisition of digital concepts becomes inevitable for students who will live and work in the digital world. The technological growth and globalization have resulted in a big gap between teaching methods at schools and ways students are getting information outside school through contact with computers and mobile phones. Currently, the Digital Natives are being taught by immigrants who are, in effect, not of the same language. This makes it imperative for technical teachers to appropriately restructure the classroom learning

environment in a way to incorporate computer-based technology instruction. This demands that teachers in technical colleges would adopt instructional methods that are active, authentic, constructive and collaborative akin to the Digital Natives that could improve the academic achievement of students in fabrication and welding technology in technical colleges. There is urgent need to bridge the existing gap in knowledge because there is still poor performance of students in technical colleges. This prompted the researchers' curiosity to investigate the effectiveness of computer tutorial model, drill and practice on students' academic achievement and retention in fabrication and welding technology in technical colleges.

2.1 Purpose of the Study

The purpose of this study was to determine the effectiveness of computer tutorial model, drill and practice on academic achievement and retention of students of fabrication and welding technology in technical colleges in Delta State. Specifically, the study sought to determine the:

1) Mean cognitive achievement score of students taught fabrication and welding with computer tutorial model, drill and practice with those taught with L-DTM.
2) Mean psychomotor retention score of students taught fabrication and welding with computer tutorial model, drill and drill and practice with those taught with L-DTM.

2.2 Research Questions

The following research questions guided the study:

1) What are the mean cognitive achievement scores of students taught fabrication and welding using computer tutorial, drill and practice with those taught using L-DTM?
2) What are the mean psychomotor retention scores of students taught fabrication and welding using computer tutorial, drill and practice with those taught using L-DTM?

2.3 Hypotheses

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

1) There is no significant difference between the mean cognitive achievement scores of technical colleges students taught fabrication and welding with computer tutorial, drill and practice with those taught using L-DTM.
2) There is no significant difference between the mean psychomotor retention scores of technical colleges students taught using computer tutorial, drill and practice with those taught fabrication and welding with L-DTM.

2.4 Significance of the Study

The findings of the study would be immense benefits to the following groups: students, teachers, curriculum planners, future researchers, education policy makers, society and parents.

The findings of the study would be of immense benefits to students, in the sense that the knowledge provided in the study would enhance their academic performance, arouse interest and address problem of retention outcome. Additionally, the findings of the study would impact positively on students/graduates in the sense that they would acquire skills/competencies, relevant knowledge through their active participation in the lesson using computer tutorial model, drill and practice.

Similarly, the awareness of the findings of the study would enable technical teachers to properly package and deliver their lessons using the lesson plan and treatment procedure provided in the study. This would guide them to effectively and efficiently utilize computer tutorial model, drill and practice in teaching fabrication and welding. This would make them more resourceful, and avail them the opportunity to develop innovative ingenuity, reflective competence and self-confidence in discharging their responsibilities in a conducive learning environment. The knowledge garnered in this work would enable curriculum planners and technical and vocational education stakeholders such as NBTE recommend effective methods of teaching fabrication and welding in technical colleges as well as aptly integrate computer tutorial model, drill and practice into the curriculum accordingly.

The findings of the study would have substantial benefit to the future researchers in the sense that it would provide empirical data for future research/investigations in related or allied professions; which could as well contribute significantly to their knowledge particularly in fabrication and welding.

The knowledge of the findings of the study, would greatly aid the Ministry of Education in the procurement of ICT equipment for effective teaching and learning in technical colleges, and also come up modalities to improve.

3. 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 timetable 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) 2 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 instruments for data collection were Fabrications and Welding Achievement Test (FWAT) adapted by the researchers from the NABTEB past examination questions between 2015 and 2018. FWAT contained 50 multiple choice test items with four options (A-D). The computer tutorial model, drill and practice were developed by the researchers with the assistance of a professional programmed developer. FWAT 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 effective for teaching considered for 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 fabrication and welding 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.

3.1 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. In the first week, the researchers visited the schools for orientation for the participating research assistants. The fabrication and welding teachers were trained on how to conduct the experiment treatment and were given prepared lesson plans. 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, drill and practice, 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, taking and writing assignments (dill and practice), 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 arc welding, gas welding, welding tools and equipment, safety precautions when welding and filing machines. 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.

In the sixth week, posttest was administered by the class teachers so as to reduce the hawthorn effect which would be introduced if the researchers administer the test. The exercise provided a posttest data for each of the dependent variables.

In the eight week, the delayed posttest was re- administered by the regular classroom teachers too, to ascertain their retention level. 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 researchers.

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).

4. Results

Research Question 1: What are the cognitive achievement scores of students taught fabrication and welding using computer tutorial model, drill and practice with those taught using L-DTM?

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

Cognitive Achievement						
Groups	**No**	**Pre-test**		**Post test**		**Mean Gain**
		Mean	**SD.**	**Mean**	**SD.**	
Experimental	51	1.879	1.289	27.121	5.533	25.242
Control	50	2.051	1.403	21.872	5,716	19.821

Table 1 shows the mean and standard deviation of achievement scores of students in experimental and the control groups. The mean scores indicated that the experimental group had higher mean scores after pretest. The mean gain for experimental group is 25.242 while that of the control group is 19.821. The mean gain is 5.421 which shows that the experimental group achieved more than the control.

Research Question 2: What are the mean psychomotor retention scores of students taught fabrication and welding using computer tutorial model, drill and practice with those taught using L-DTM?

Table 2 showed the mean and standard deviation of achievement scores of students in experimental and the control groups. The mean scores indicated that the experimental group had higher retention mean scores. The mean gain 12.307 which shows that the experimental group retain more than the control group.

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

Psychomotor Retention				
			Retention test	
Groups	**No**	**Mean**	**SD_1**	**Mean Gain**
Experimental	51	35.95	11.901	12.90
Control	50	23.05	7.507	

Hypothesis 1: There is no significant difference between the mean scores of experimental group and control group in the cognitive achievement of students in fabrication and welding in technical colleges.

Table 3: Summary of Analysis of Covariance (ANCOVA) for Differences in Achievement of Students

Source	**Type III Sum of Squares**	**Df**	**Mean Square**	**F**	**Sig.**
Corrected Model	591.605a	2	295.802	9.5610	.000
Intercept	3649.742	1	3649.742	117.9630	.000
Pretest	743.232	1	74.232	2.3990	126
Group	539.381	1	539.381	17.4330	.000
Error	2134.840	99	309160		
Total	45164.00	101			
Corrected Total	2726.44	100			
Significance at sig of F less 0.05					

Table 3 shows that there is significant main effect of treatment in the post test achievement of students in the experimental and control groups $F(1, 113) = 17.4330$, $p< 0.05$. This means that there was significant difference in the mean achievement scores of students in the experimental group and the control group. The hypothesis that there is no significant mean difference in the achievement of students taught with computer tutoring system instructional method and lecture-demonstration method is therefore rejected.

Hypothesis 2: There is no significance between the mean scores of experimental and control groups in the psychomotor retention of students in fabrication and welding in technical colleges.

Table 4 shows that there is significant main effect of treatment in the post test retention mean score of students in the experimental group and the control groups $F(1. 113) = 455300$, $p< 0.05$. This means that there was significant difference in the mean retention scores of students in the experimental and control groups. The hypothesis that

there is no significant difference in the retention mean scores of students in experimental and control group is therefore rejected.

Table 4: Summary of Analysis of Covariance (ANCOVA) for Differences in Retention of Students in Fabrication and Welding Technology

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	5758.827	2	2879.414	512050	0.000
Intercept	559.949	1	5590.949	99425	0.000
Pretest	2789.729	1	2789.729	49611	0.000
Group	2568.292	1	2560.292	455300	0.000
Error	3880.049	99	56.233		
Total	70017.000	101			
Corrected Total	9679.875	100			
Significance at sig of F less 0.05					

5. Discussion of Results

The finding revealed that the effect of computer tutorial model, drill and practice instructional medium on students' cognitive achievement is higher than the effect of lecture-demonstration teaching method on students' cognitive achievement. This could be as result of activities that was incorporated in computer tutorial and drill instructional medium components, which may have strengthened the cognitive ability of the students. This result is in line with the findings of Adedoja and Fakokunde (2015), which reported respectively that computer tutorial and drill had significant effect on the post-test achievement scores of students.

Also, the study revealed that the students taught using computer tutorial and drill instructional medium retained better what they have learnt over a period of time than those taught with L-DTM. This means that computer tutorial and drill used in teaching the students was significant on students' retention. This findings is in line with Akcy, Durmaz, Tuysuz and Feyzioglu, (2006) who found that, students taught using computer tutorial model, drill and practice were able to retain the concepts than those students taught using L-DTM is could be as result of activities and experiences involved in computer tutorial and drill which made the students to develop and construct their own knowledge meaningfully and retain the concepts taught for longer period of time.

6. Conclusion

Based on the findings of the study, it was concluded that computer tutorial model, drill and practice instructional medium is an innovative, effective and efficient method for improving students' cognitive achievement and psychomotor retention in fabrication and welding technology in technical colleges.

6.1 Recommendations

Based on the findings of the study, the researcher recommends the following:

1) Teachers especially those teaching fabrication and welding, vocational and technical subjects should adopt computer tutorial, drill and practice instructional strategy to enhance students' achievement and retention of learning in technical and vocational trades programmes.
2) Production of software package should be integrated as part of course of study in the department of Vocational Teacher Education in Nigerian.
3) Teachers and students should break away from the old method of teaching and ensure the instruction in technical colleges become student and self-assisted learning oriented.
4) Teachers should develop interest in the use of computer tutorial model drill and practice instructional medium and therefore should develop ICT skill and knowledge in order to enhance their use in technical college classrooms.
5) All primary and secondary schools should be equipped with ICT facilities for teaching and learning processes to enable the pupils and students develop computer literacy and skills from elementary schools which will eventually assist them in a better usage of ICT facilities in technical colleges.
6) Workshops and seminars should be organized by Ministries of Education and related Government agencies to enlighten fabrication welding teachers and other vocational and technical teachers to improve their knowledge and skills on the use of computer tutorial and drill and ICT facilities.

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