Comparative Effect of Computer Tutorial and Computer Drill and Practice Technique on Secondary School Students' Achievement in Computer Studies

Abigail M. OSUAFOR and **Theresa N. ONOH,**

Department of Science Education, Nnamdi Azikiwe University, Awka, Nigeria

Abstract

The study investigates the comparative effect of computer tutorial and computer drill and practice techniques on secondary school students' achievement in computer studies. Five research questions and four hypotheses guided the study. Quasi-experimental research design, specifically the pretest posttest which involved group of students assigned to treatment groups was adopted for the study. The study was carried out in Awka Education Zone of Anambra State. The population for the study was 2,250 SS II students from 15 government-owned co-educational secondary schools in Awka Education zone of Anambra State. The sample size for the study was 78 SSII students selected through balloting sampling. A 25 item multiple choice question of CSAT was the instrument used to collect data. One experimental group was taught using computer tutorial technique while the other experimental group was taught using computer drill and practice technique. Mean and standard deviation were used to answer the research questions and ANCOVA was used to test the null hypotheses at 0.05 level of significance. The findings revealed that students taught using computer drill and practice technique achieved more than those taught with computer tutorial technique. Based on the findings, it was recommended among others that the use of computer drill and practice technique should be embraced by teachers to convey their instruction in classroom since it has been found to be effective in computer studies students' achievement.

Keywords: Achievement, computer drill and practice technique, computer studies, computer tutorial technique.

Introduction

Education has always been flooded with new ideas about teaching and learning. Teachers and administrators are regularly informed with suggestions for reform. Teaching has been described as a complex cognitive activity whether delivered in a teacher-centered or learner-centered classroom (Marzano, 2007). According to Barry (2010), Teaching is an activity that involves establishing attainable learners' goals, enhancing learners' interaction with new knowledge that deepens understanding and ensures effective formative and summative assessment practices. When students are actively involved in the learning task, they learn more than when they are passive recipients of instruction. Since students generally learn better when they practice, it is helpful for the teacher to consider how closely related the learning tasks are to desired learning outcomes.

Teacher-centered teaching methodologies are considered obsolete; a big burden with little impact on the learning development of the child. Bello, Bukar and Ibi (2016)

maintained that learners possess within themselves certain potentialities for development, and that it is the task of the teacher to make these potentials develop itself instead of imposing some external measures. Hence, exposure of the learner at early stage of education is regarded as a foundation upon which the success or failure of future educational system lies (Bello, Bukar&Ibi, 2016). Studies from Maran (2003), Bame (2004) in Bello, Bukar and Ibi (2016) confirmed that the negative attitude of learners at the basic education level towards certain subject is as a result of poor teaching methods. Therefore in this regard the use of effective teaching techniques like tutorial, drill and practice techniques of the CAI at this level of education is vital to the survival of the system. Practitioners in this context advocated a child-centered education and their views had a great deal of influence on modern educationists. There are hues and cries that teachers at various levels of education are accustomed to traditional methods of teaching especially the traditional lecture method which is teacher-centered; this method leads to poor learning.

Poor teaching methods, affect students' achievements in all content areas, especially computer studies. Sander (2001) stated that effective teaching method helps the learner to learn better while poor teaching method will naturally lead to poor learning and consequently poor achievement. Evidence from literature showed that most science teachers in Nigerian secondary schools predominantly use traditional lecture method in teaching science due to poor knowledge and no exposure to other learner-centered methods like computer tutorial, computer drill and practice techniques, leading to poor achievement (Anderson, 2001, Fredman, 2002, Omoniyi, 2006).

Tutorial is the presentation of teaching materials gradually. Computer tutorial provides information, generally new information to students in much the same manner as human teacher or tutor might, it typically uses text and graphic to represent contents. Embedded questions and review activities are used to assess the ability of students in acquiring the contents. As the name implies tutorial 'tutor' students; its function is similar to that of a teacher or textbook in explaining information or concepts to learners (Aktaruzzaman& Muhammad, 2011). Rusman` (2011) states that tutorial is giving directives, assistance, guidance and motivation to students to learn effectively and efficiently. According to Rusman (2011), the purpose of computer-based learning tutorial models are; to improve the mastery of knowledge independently by students according to the material contained in the program, assist students in finding and solving problems in learning independently and increase the independence of students in the study of other materials.

Besides the use of computer tutorial for improving students' interaction with the learning environment, another way of enhancing learning is with the use of drill and practice (DP) technique. Drill and practice is a computer -instruction technique involving series of structured problems or exercises with immediate feedback to student responses. Students answer a question and get immediate feedback. Feedback can be as simple as correct or incorrect. Drill and practice provide students with practice on concepts that they have already learned. Good drill and practice provide feedback and explains how to get the correct answer. Some contain student management systems that keep track of students' progress. Drill and practice like memorization involves repetition of specific skills such as addition, subtraction or spelling. DP method involves repetition in which students can

gain proficiency in the subject they learn (Syed, Agil& Omar, 2007). Yahya Aziz and Chu Siew Pang (2010) in identifying drill and practice method emphasizes repeat activity of the facts or the efficiency gained. Tica (2004) also revealed that by using DP, the students will be good in the subject and improve their way of learning.

Academic achievement has to do with how much knowledge the individual has acquired from school. Students' achievement connotes performance in school subject as symbolized by a score or mark on an achievement test. Achievement is described as something someone has done successfully using his own effort and skills (Ali in Osuafor&Obialor, 2016). Achievement is the degree or level of success attained at the end of an academic endeavour (Iwundu in Ehibudu&Opurum, 2013). As a concept in teaching-learning process, achievement means attainment in a school subject as symbolized by a score or a mark on achievement test (Okoro in Abd-El-Aziz &Abd-El-latif, 2013). It is quantified by a measure of student's academic standing in relation to those of other students of same age (Anene, 2005). Students' achievement is dependent upon several factors among which are instructional methods and learning environment (Atherton, 2003); gender also cannot be ruled out.

Purpose   of   the study

The purpose of this study is to compare the effect of computer tutorial and computer drill and practice techniques on secondary school students' achievement in computer studies. Specifically, the sought to (a) Compare the mean achievement scores of students taught with computer tutorial technique and those taught with computer drill and practice technique. (b) Compare the mean achievement scores of male students taught computer studies with computer tutorial technique and those taught with computer drill and practice technique.

Research Questions
The following research questions guided the study (a)What are the mean achievement scores of students taught computer studies with computer tutorial technique and those taught with computer drill and practice technique? (b) What are the mean achievement scores of male students taught computer studies using computer tutorial technique and those taught using computer drill and practice technique. (c) What are the mean achievement scores of male and female students taught computer studies with computer drill and practice technique?

Hypothesis
The following null hypotheses were tested at .05 level of significance.
  Ho1. There will be no significant difference between the mean achievement scores of students' taught computer studies with computer tutorial and that of those taught with drill and practice techniques.
  H02.   There will be no significant difference between the mean achievement scores of male and female students' taught computer studies with computer tutorial technique.

Method

This study was conducted using quasi–experimental design. Specifically, the pre-test post–test non-equivalent group design was used. The population of the study comprises of all the 2,250 Senior Secondary two (SS2) students in public co-educational secondary schools in Awka South Local Government Area of Anambra State (PPSSC, Awka, 2018). The sample was made up of 78 SSII computer studies students. A 25 item multiple choice question of CSAT was the instrument used to collect data. . Prior to classroom exercise, teachers who acted as research assistants were briefed on how to use the two CAI techniques (tutorial and drill and practice). The pretests were administered to the two experimental groups before treatment commenced. One experimental group was taught using computer tutorial technique and the other experimental group was taught using computer drill and practice technique. Posttest was administered to both groups after treatment. In analysis of data, mean and standard deviation were used. ANCOVA was used to test the hypotheses.

Results

Table 1:MEAN ACHIEVEMENT AND STANDARD DEVIATION SCORES OF STUDENTS TAUGHT COMPUTER STUDIES WITH COMPUTER TUTORIAL AND THOSE TAUGHT WITH COMPUTER DRILL AND PRACTICE

Teaching Techniques	Pre-test			Post-test			Mean Difference
	N	Mean	SD	N	Mean	SD	
Computer Tutorial Technique	78	21.38	5.39	78	40.62	6.48	19.24
Computer Drill & Practice	78	25.74	5.60	78	45.54	6.12	19.80

The descriptive statistics displayed in table 1 shows that the pre-test mean achievement scores of students taught computer studies using computer tutorial and computer drill and practice were 21.38 and 25.74 respectively. Those taught with computer drill and practice were ahead of their counterpart in the pre-test and also had a higher post-test mean scores (Mean = 45.54) compared to those taught with computer tutorial technique (Mean = 40.62). The mean differences of 19.24 and 19.80 for the two groups show that students taught with computer drill had a slightly higher improvement in computer studies achievement than those taught with computer tutorial technique.

Table 2.MEAN ACHIEVEMENT AND STANDARD DEVIATION SCORES OF MALE STUDENTS TAUGHT COMPUTER STUDIES WITH COMPUTER TUTORIAL AND THOSE TAUGHT WITH COMPUTER DRILL AND PRACTICE

Teaching Techniques	Pre-test			Post-test			Mean Difference
	N	Mean	SD	N	Mean	SD	
Computer Tutorial Technique	27	18.52	6.19	27	37.19	7.00	18.67
Computer Drill & Practice	27	22.07	4.49	27	41.93	4.88	19.86

As displayed in table 2, male students taught with computer drill and practice had a higher pretest mean score than those taught with computer tutorial techniques as shown by their mean scores of 22.07 and 18.52. In the same vein, male students taught with computer drill and practice had a higher post-test mean score (Mean = 41.93) than those taught with computer tutorial technique (Mean = 37.19). The mean difference of 19.86 for male students taught with computer drill and practice technique shows that they did better in computer studies achievement than those taught with computer tutorial technique (Mean difference = 18.67).

Hypothesis 1
There will be no significant difference in the mean achievement scores of students' taught computer studies with computer tutorial and that of those taught with drill and practice techniques.

Table 3 SUMMARY OF ANALYSIS OF COVARIANCE OF STUDENTS' MEAN ACHIEVEMENT SCORES IN COMPUTER STUDIES BY TEACHING TECHNIQUES

Source of Variation	SS	df	MS	F	p-value	Decision
Pre-test	1699.66	1	1699.66	58.81	.000	
Teaching Techniques	176.22	1	176.22	6.10	.015	Significant
Error	4422.19	153	28.90			
Total	296544.00	156				

The result presented in table 3 shows that there was a statistically significant difference in mean achievement of students taught computer studies with computer tutorial technique and those taught using computer drill and practice technique, $F(1,153) = 6.10$, $p<0.05$. Since the p-value was less than 0.05, the null hypothesis was rejected.

Hypothesis 2

There will be no significant difference in the mean achievement scores of male and female students' taught computer studies with computer tutorial technique.

Table 4 SUMMARY OF ANALYSIS OF COVARIANCE OF STUDENTS' MEAN ACHIEVEMENT SCORES IN COMPUTER STUDIES FOR STUDENTS WITH COMPUTER TUTORIAL TECHNIQUE BASED ON GENDER

Source of Variation	SS	Df	MS	F	p-value	Decision
Pre-test	527.18	1	527.18	17.80	.000	
Gender	128.93	1	128.93	4.35	.040	Significant
Error	2221.41	75	29.62			
Total	131904.00	78				

The result presented in table 4 shows that there was a statistically significant difference in mean achievement of male and female students taught computer studies with computer tutorial technique, $F(1,75) = 4.35$, $p<0.05$. The null hypothesis was therefore rejected.

Discussion

The result revealed the mean gain of students taught computer studies using computer tutorial and computer drill and practice were 21.38 and 25.74 respectively. Those taught with computer drill and practice were ahead of their counterpart in the pre-test and also had a higher post-test mean scores (Mean = 45.54) compared to those taught with computer tutorial technique (Mean = 40.62). The mean differences of 19.24 and 19.80 for the two groups show that students taught with computer drill had a slightly higher improvement in computer studies achievement than those taught with computer tutorial technique.

Analysis of variance shows that there was a statistically significant difference in mean achievement of students taught computer studies with computer tutorial technique and those taught using computer drill and practice technique, $F(1,153) = 6.10$, $p<0.05$.

Conclusion and Recommendations

From the findings of the study, it is evident that computer drill and practice technique had significant effect on students' achievement in computer studies. (a) Since computer drill and practice technique was found to be more effective for improving students' achievement in computer studies, computer studies teachers should adopt its use in teaching computer studies in secondary schools. (b) Curriculum planners should emphasize more on the use of computer drill and practice technique in teaching and learning of computer studies so as to popularize its use among teachers. (c) In-service training, workshops, seminars and symposia should be organized by Ministry of Education, professional associations like Curriculum Organization of Nigeria (CON), Science Teachers Organization of Nigeria (STAN) for practicing teachers to enable them understand and practice the use of computer drill and practice technique in computer studies classroom.

References

Aktaruzzaman, M.D & Muhammad, K. (2011). A comparison of traditional method and computer aided instruction on students achievement in educational research. *Academic research international, 1*(3), 53-246.

Barry, R.A., (2010). *Teaching effectiveness and why it matters*. Portland, OR: Marylhurst University and the chalkboard project.

Bello, S, Bukar, I.B, Ibi, M.B (2016). Supply and utilization of ICT facilities for sustainable education development in Federal Colleges of Education in North-East, Nigeria*: IJCER jOURNA ,2* (6), 19-34

Marzano, R.J. (2007). *The art and science of teaching.A comprehensive framework for effective instruction.* ASCD: United States.

Rusman (2011). *Learning models: development teacher professional*. Jakarta. Raja GrafindoPersada.

Sander, W. (2001).Chicago public schools and student achievement.*Urban Education, 36* (1), 27- 38.

Syed A., Omar, S. (2007). *The prolegomena: social science and the economic analysis of IbnKhaldun.*Unpublished master's thesis, University Tun Abdul Razak, Malaysia.

Yahaya, Aziz and Chu, Siew Pang (2010).*Teori-TeoriPembelajaran*, University technology, Malaysia.

Biographical Note

Abigail M. OSUAFOR, *PhD,* is an Associate Professor of Science Education in the Department of Science Education, and the Head of Department, Science Education, Nnamdi Azikiwe University, Awka, NIGERIA. She has published widely. Email: am.osuafor@unizik.edu.ng.

Theresa N. ONOH is a Post Graduate student in the Department of Science Education, Nnamdi Azikiwe University, Awka, NIGERIA. Email: theresaonoh@gmail.com.