

EFFECTS OF COMPUTER DRILL, PRACTICE AND DEMONSTRATION ON JUNIOR SECONDARY SCHOOL STUDENT'S ACHIEVEMENT IN BASIC SCIENCE AND TECHNOLOGY IN ABUJA MUNICIPAL AREA, ABUJA.

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Abstract

The study investigated the "Effects of Computer Drill, Practice and Demonstration Strategy on Junior Secondary School Student's Basic Science Achievement in Abuja. The study adopted a 3x2x2 pre-test, posttest non randomized non-equivalent group factorial research design. A purposive sampling technique was employ to select three schools in Abuja Municipal Area Council (AMAC) 220 (38 male and 44 female), (28 male and 48 female), (28 male and 34 female) were selected as sample for both experimental group and control group respectively. Computer, drill and practice instructional package and Basic science and Technology Achievement test were used as Data Collection Instruments. The reliability index of each of the instrument using Pearson product Moment Correlation Co- efficient test was 0.72 respectively. Three research questions and three corresponding hypotheses were raised to guide the study. The hypotheses were tested at 0.05 level of significant. The statistical analyses were done using Analysis of variance (ANOVA), Descriptive statistics, Analysis of Covariance (ANCOVA), Shefes Post hoc and independent t- test. The major findings were that students taught Basic science using computer drill and Practice performs significantly better than those taught with demonstration strategy. The findings of the study also revealed that students taught with demonstration strategy performed better than those taught with the conventional method. There is no significant difference in the mean achievement score of male and female students taught Basic Science using computer drill, practice and those taught with demonstration strategy. Based on the findings, it was recommended among others that computer drill Practice and demonstration strategy should be used to complement the teaching of Basic Science and Technology to improve the achievement of students.

Keywords: Computer Drill and practice, Demonstration Strategy, Basic Science, Achievement, Students

Introduction

The essence of education is to transfer the culture of the society to the learners and one of the means in which this can be achieved is through the curriculum (Momoh, 2017). Ajileye (2015) asserted that due to the dynamic nature of the society and the changes that takes place especially in the teaching and learning of content, instructional method, resources and evaluation procedures there is need to integrate Information and Communication Technology in education to supplement the traditional method of teaching which is usually teacher center for effective teaching and learning. Therefore, the introduction of Information and Communication Technology in the school curriculum is one of the novelty and reforms in National Policy on Education (Olugbuni, 2013). Thus, introducing computer drill, practice and demonstration strategy by teachers in education becomes one of the ways of improving the curriculum at all level of education especially when it is employed in teaching Basic Science and Technology in Junior Secondary Schools.

Basic Science and Technology is one of the core subject offered at the upper basic education level (JSSI-JSS3) which provide students with appropriate experiences in science and technology in order to achieve the objectives of the science and technology curriculum through scientific enquiry, exploration and acquiring manipulative skill (FRN, 2014). Based on the aforementioned significance of the subject, Basic Science and Technology is considered one of the vital subjects in the school curriculum (FRN, 2004). Therefore, to improve on the achievements of students, with emphases on content, instructional strategy for effective teaching and learning of Basic Science and Technology at the Junior Secondary School level of education there is need to embrace technology in the school curriculum especially in the teaching of content. Instructional strategy such as Computer Drill, Practice and Demonstration Strategies may be effective instructional technology that can be employed to enhance student's achievement especially in primary and secondary education.

Computer Drill and Practice is one of the new innovative and strategy of teaching. It is mechanical and repetitive teaching devices that present subject matter for learning either with a programmed text or with a computer. It is also an instructional strategy and a self-teaching method whereby computer provides a programmed material which is a combination of teaching and test items that takes students through the materials to be learnt. The students are presented with small units of lesson hierarchically where they are expected to work through the programmed materials by themselves and at their own rate (Lee, 2004). One of the characteristic of Computer Drill and Practice is that questions are constructed in the form of filling in the blank where students pick answer from a chain of options. When students answers rightly, the programme tells the reason why the students is correct and moves to a new unit but if the students answers wrongly the programme tells the student that a mistake has been made and then directs the students back to the proceeding unit to study again. One of the demerits of Computer Drill and Practice is that it gives room for continuous criticism of wrong and right answer. Crowder (1959) was of the view that students not only learn by giving the correct answer but also by making mistake. Therefore as one of the merit of Computer Drill and Practice, a wrong answer is always remedied to remove learning weakness.

Another strategy highly commended by educators is demonstration approach to teaching and learning. Demonstration Strategy as one of the traditional teaching method can also be employed to improve student's achievement. Demonstration method is used to tell or explain how learning activities are carried out. It also help student to be conversant with the way equipment and apparatus are used (Uzuoma, 2005). In view of the above, Isa (2007) stated that demonstration teaching method enables students to interact and become familiar with objects and phenomena which will lead to a better achievement on the concept taught (Uhumuavbi & Mammudu, 2009).

Achievement is viewed as learning outcomes among Basic Science and Technology students which are exemplified in their performances in school subject as symbolized by a score in a test (Noble, 2013). Despite the importance attached to the teaching of Basic Science and Technology at the junior secondary school level especially in Federal Capital Territory (FCT) Abuja Municipal Area Council (AMAC) there are a lot of factors affecting the teaching and learning of Basic Science which has been identified by Kent and Taylor (2016) as poor learning environment, Poor instructional delivery, lack of instructional materials, and poor method of teaching among others which has led to the continuous poor performance of students in the subject. Students inability to retain learned concept as well as gender disparity constitute a serious problem in teaching and learning especially when this subjects are taught abstractly without the use of instructional materials that could help illustrate the content of the lesson (Ajai & Imoko, 2015). Meanwhile little research is known to have been carried out in computer drill and practice and demonstration method in social studies, Agriculture in primary schools and none has been done using these approaches to teach computer science concept in junior secondary school in Abuja Municipal Area Council, Federal Capital Territory, Abuja. Therefore the researcher wants to fill a gap in this study by using computer drill, practice and demonstration strategy to teach students Basic Science and Technology to find out which one that will have more positive effect in teaching and learning. It is against this backdrop that the researcher investigated the Effects of Computer Drill, Practice and Demonstration Strategy on Junior Secondary School Student's Basic Science and Technology Achievement in Federal Capital Territory (FCT) Abuja.

Aim and Objectives of the Study

The aim of this study is to investigate the "Effects of Computer Drill, Practice and Demonstration Strategy on Junior Secondary School Student's Basic Science and Technology Achievement in Federal Capital Territory (FCT) Abuja. Specifically, the study objectives are to:

1. determine the difference in the mean achievement of junior secondary school students taught Basic Science and Technology concept using Computer drill, practice, Demonstration strategy and conventional Method.
2. find out the influence of gender on the achievement of students taught Basic Science and Technology concept with Computer Drill and Practice,
3. determined the influence of gender on the achievement of students taught Basic Science and Technology concept with Demonstration Strategy

Research Questions

1. What is the difference in the mean achievement score of junior secondary school students taught Basic Science and Technology using Computer Drill and practice, Demonstration method and those taught using conventional method in Abuja Municipal Area Council, Federal Capital Territory (FCT)?
2. What is the difference in the mean achievement score of male and female students taught Basic Science and Technology using Computer drill, practice in Abuja Municipal Area Council, Federal Capital Territory (FCT)?
3. What is the difference difference in the mean achievement score of male and female students taught Basic Science and Technology using Demonstration method in Abuja Municipal Area Council, Federal Capital Territory (FCT)?

Research Hypotheses

1. There is no significant difference in the mean achievement score of junior secondary school students taught Basic Science and Technology using Computer Drill and practice, Demonstration method and those taught using conventional method in Abuja Municipal Area Council, Federal Capital Territory (FCT).
2. There is no significant difference in the mean achievement scores of male and female students taught Basic Science and Technology using Computer drill practice in Abuja Municipal Area Council, Federal Capital Territory (FCT).
3. There is no significant difference in the mean achievement score of male and female students taught Basic Science and Technology using Demonstration method in Abuja Municipal Area Council, Federal Capital Territory (FCT).

Research Methodology

The study employed quasi- experimental design. The population of the students comprised the entire JS II students of 53 junior secondary school students with a total population of 7,782 in Abuja Municipal Area Council during 2018/2019 academic session. The target population comprised Junior Secondary School II Students. The choice of JSS II classes as the target was based on the fact that they already had background knowledge of Basic Science and Technology in J SS I and the concept taught fell under their syllabus and scheme of work. The sample for the study comprised of two hundred and twenty students of JS II in the selected schools. A purposive sampling technique was adopted to select three co-educational junior secondary schools in Abuja Municipal Area Councils (AMAC). These schools were Junior Secondary School Airport Road, Gosa and Lugbe. The reason for purposively selecting three schools was based on the availability of computer facilities, electricity and other ICT facilities. The three schools selected were randomly assigned into Experimental Group 1 (Computer Drill and practice mode) Experimental Group 11 (Demonstration Strategy) and control group (Conventional Lecture Method) respectively using simple random sampling. One research instruments were used for this study namely Treatment Instrument (Computer drill and practice mode) and Test Instrument (Basic science Achievement Test). The Basic Science and Technology Achievement Test (BSTAT) consisted of two section, A and B. Section A sought the demographic data of students. While section B was designed to take care of information on students cognitive level based on what they were taught. The computer drill and practice instructional package was validated by two experts in the department of Educational Technology, FCT College of Education Zuba and two Senior Lecturer in the Department of Educational Technology, School of Science and Technology Education, Federal University of Technology (FUT) Minna. The Basic Science and Technology Achievement Test (BSTAT) were validated by two Basics Science Teachers in Federal Capital Territory (FCT) and two Senior Lecturer in the Department of Educational Technology, School of Science and Technology Education, Federal University of Technology (FUT), Minna. The reliability index was 0.72 using Pearson Product Moment Correlation Coefficient. The data were analyzed using analysis of variance (ANOVA) and descriptive statistics. Analysis of Covariance ANCOVA) and independence t-test statistics were used to test the hypotheses using statistical package for social sciences SPSS) version 20.0 at the 0.05 level of significance. Where there was a difference, Scheffes post hoc was used to determine where the differences lie

Result and Discussion

The table below shows the outcome of the analysis of data collected

Table 1 Summary of the ANOVA Comparison of the Pre-test Mean Achievement Scores of Experimental and Control Groups

Groups	Sum of squares	Df	Mean square	F	Sig.
Between groups	1390.704	2	695.352	6.727	.001
Within Groups	22431.455	217	103.371		
Total	23822.159	219			

*: Significant at 0.05 levels.

Tables 1 show the ANOVA comparison of pretest scores of Experimental 1 Experimental II and Control groups. An examination of the table shows significant difference between the mean achievement scores of the three group ($F_{(2,217)}=6.73$, $p < 0.005$). Hence, Analysis of Covariance was used to adjust scores on dependent variables for initial differences on other variables find as pre-test achievement scores.

Table 2 Mean Gain of Achievement Score of Experimental 1,2 and Control Groups

Group	N	Pre-test		Post-test		Mean Gain Score
		Mean (X)	SD	Mean (X)	SD	
Experimental 1	82	36.87	10.39	74.41	7.49	37.54
Experimental II	76	42.76	10.46	85.14	6.62	42.38
Control	62	40.35	9.48	70.05	5.68	29.70

Table 2 shows the mean and standard deviation of pre-test, post test scores and mean gain of all the three groups observed in the achievement scores of the students. Experimental group II had the highest mean gain score of 42.38, followed by Experimental group 1 with mean gain of scores 37.54 while the control group had a mean gain score of 29.70.

Hypothesis One

HO₁ There is no significant difference between the mean achievement scores of Junior secondary school students taught basic science using computer drill and practice (CDP), demonstration strategy (DS) and those taught with the convention lecture method.

Table 3 Summary of ANCOVA Analysis of the Mean Achievement Scores of Experimental Group 1,2 and the Control Group.

Treatment	Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	8643.318 ^a	3	2881.106	63.972	.000
Intercept	73040.885	1	73040.885	1621.785	.000
Covariance (Pretest)	1390.704	1	695.352	6.727	.001
Treatments	8163.670	2	4081.835	90.632	.000
Error	9728.064	216	45.037		
Total	1319058.000	220			
Corrected Total	18371.382	219			

*: Significant at 0.05 level

Table 3 shows the ANCOVA analysis of mean scores of Experimental group I, Experimental group II, and Control group with $F(2,217) = 90.632$ and p-value was 0.000. since $p < 0.05$, hypothesis one was rejected. Therefore, there is significant difference between the mean achievement scores of junior secondary school student taught with computer drill and practice, demonstration strategy, and those taught with the conventional lecture method.

To find out where the significant difference lies, Scheffes post-hoc summary test was carried out. Table 4.4 shows the summary of Scheffes post-hoc.

Table 4 Scheffes Post hoc Test on Mean Scores of Student Achievement Using Demonstration Strategy, Computer Drill /Practice and Conventional Method Method.

	Demonstration	Computer Drill and Practice	Conventional Method
Demonstration Strategy	-	-10.73*	4.37*
Computer Drill and Practice	-10.73*	-	15.10*
Lecture Method	- 437*	-15.10*	-

*: Significant at $P < 0.001$

Table 4 shows that demonstration compared with computer drill and practice is significant. Also demonstration with lecture method is significant in favour of computer drill and practice.

Table 5 Mean Gain of Mean Achievement Scores of Male and Female Junior Secondary School Students Taught Basic Science Using Computer Drill and Practice (CDP)

Group	N	Pre-test Mean (X)	SD	Post-test Mean (X)	SD	Mean Gain Score
Male	28	42.68	10.88	82.25	9.12	39.57
Female	48	42.40	10.44	86.46	6.03	44.06

Table 5 shows the Mean and standard deviation of pre-test, post-test scores and mean gain scores of male and female student. Female students had the higher mean gain score of 44.06 followed by male students with mean gain scores of 39.57.

Hypothesis Two

HO₂ There is no significant difference in the mean achievement scores of male and female students taught Basic Science and Technology using computer drill and practice (CDP).

Table 6 t-test Comparison of Post-test Mean Achievement Score of Male and Female Junior Secondary School Students Taught Basic Science and Technology Using Computer Drill and Practice (CDP)

Group	Variance	N	Df	X̄	SD	t-value	P-value
Post	Male	28	74	82.25	9.12	0.15 ^{NS}	0.02
	Female	48		86.46	6.03		

*: Significant at 0.05 level

Table 6 shows the t-test analysis of posttest mean achievement scores of male and female junior secondary school students taught Basic Science using computer drill and practice mode (CDPM). $t = 0.15$, $df = 74$, $P\text{-value} = 0.02$. Since $P < 0.05$, hypothesis two was rejected. Therefore, there is significant difference between the mean achievement scores of male and female junior secondary school students taught Basic Science and Technology using computer drill and practice (CDP)

Table 7 Mean Gain Achievement Score of Male and Female Junior Secondary School Students Taught Basic Science and Technology Using Demonstration Strategy

Group	N	Pre—test Mean (X)	SD	Posttest Mean (X)	SD	Mean Gain Score
Male	38	37.34	11.39	73.42	6.91	36.08
Female	44	36.45	9.56	75.27	7.93	38.82

Table 7 shows the mean and standard deviation of pre-test, post-test scores, and mean gain score of male and female students as observed in the achievement scores of the students. Female students had the higher mean gain score of 38.82 as against male student with mean gain score of 36.08.

Hypothesis Three

HO₃ There is no significant difference between the mean achievement scores of male and female students taught Basic Science and Technology using demonstration strategy (DS).

Table 8 t-test Comparison of Posttest Mean Achievement Score of Male and Female Junior Secondary School Students Taught Basic Science and Technology Using Demonstration Strategy(DS)

Group	variance	N	Df	X	SD	t-value	P-value
Male	38	73.42	6.91				
Post			80			0.80 ^{NS}	0.27
Female	44	75.27	7.93				

NS: Not Significant at 0.05 level

Table 8 shows the t-test analysis of posttest scores of male and female junior secondary school students taught Basic Science and Technology using demonstration Strategy (DS), $t=0.8$ with $df = 80$, $p\text{-value} = 0.27$. since $p < 0.05$ hypothesis four is retained. Therefore, there is no signature difference between the mean achievement score of male and female junior secondary school student taught Basic Science and Technology using demonstration Strategy (DS).

Discussion of Result

The findings of this study on the effect of computer drill, practice and demonstration strategies on student's achievement in Basic Science revealed that there was a significant difference between the mean achievement scores of junior secondary school student taught Basic Science using computer drill and practice, demonstration strategy, and conventional lecture method. This result is in agreement with the study of Fagbemi (2004) who stated that students taught with self-instructional package performed better than those taught with the conventional lecture method. The study is also in corroboration with the study of Daluba (2013) who found that students in the experimental group taught with demonstration method performed better than those taught with conventional lecture method.

The finding of the study on the influence of gender on student's achievement taught Basic Science using computer drill and practice showed that there was a significant difference in the mean achievement scores of male and female students. This finding is in agreement with Ajaja and Eravwoke (2010) who investigated the effects of gender on students' academic achievement. The result of their findings showed that there was a significant difference in the achievement of male and female students when computer-assisted was used. The findings of the study on the influence of gender on achievement of students taught Basic Science using Demonstration Strategy reveals that there was no significant difference between the mean achievement scores of male and female students.

Conclusion

The findings of this study reveal that the use of computer drill practice, demonstration strategy and conventional lecture method are effective for Basic Science teaching in Junior Secondary School Abuja

Municipal Area Council (AMAC). The findings of the study also have convincing evidence that the use of computer drill, practice and demonstration strategy in Basic Science teaching can enhance junior secondary school students' achievement compared to using conventional lecture method.

Recommendations

1. Computer drill, practice, and demonstration strategy, should be adopted by Basic Science and Technology teachers in teaching Basic Science as supplement to other traditional instructional strategies since it has been proven to enhance students achievement and retention
2. Government should sensitized teachers on the availability of different computer-based instructional (CBI) strategies that can yield better result in teaching and learning of Basic Science.
3. Government should provide computer facilities in junior secondary school that would encouraged the use of Computer Drill and practice instructional packages as this would make teachers and students to be acquainted with educational technology tools.
4. Government should trained and re-trained teachers through workshops and seminars on different programming styles for effective utilization of computer drill and practice in the classroom for better results.

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