

**EFFECTS OF ICT LEARNING STRATEGY ON STUDENTS' PERFORMANCE IN
BASIC SCIENCE AND TECHNOLOGY AMONG JUNIOR SECONDARY SCHOOLS
IN NIGER STATE, NIGERIA**

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ABSTRACT

This research determined the influence of ICT learning strategy on Junior Secondary students' performance in Basic Science and Technology. The research adopted quasi experimental design. The population of the study was 44586 junior secondary school two (JSS11) students. 180 students were purposefully and randomly sampled among Junior Secondary two (JSS11) students of three junior secondary schools in the state. Two research questions and two null hypotheses were formulated and tested at 0.05 level of significance. A validated instrument, i.e Basic Science and Technology Performance Test (BTPT) was used for data collection. The reliability coefficient of the BTPT was obtained using Pearson Product Moment Correlation as 0.87. The study used Means, Standard deviation and t-test Statistics as tools for the data analyses. The results showed that there was a significant difference between those taught using ICT learning strategy and those taught using lecture method in favour of those taught using ICT learning strategy. In addition, the results revealed that boarding students significantly perform better compared to day students when taught using ICT learning strategy. Based on the findings, it was recommended among the other things that Secondary school teachers should be encouraged to use ICT learning strategy in the teaching of basic science and technology. And also, Parent should encourage their wards to be studying in the boarding schools as well as government to build more boarding schools.

Keywords: ICT Learning, Boarding Students, Day Students, Performance,

INTRODUCTION

The various methods of teaching basic science and technology have not significantly increased students' achievement in the subject for more than a decade. Therefore, it is timely to seek a method for teaching basic science and technology to maximize outcomes at this crucial time when science and technology are seen as the foundation of national development and advancement. Mstem (2010) reported that teaching method influences students' responses and determines whether or not they are interested, motivated, and engaged in a lesson in a manner that encourages learning. According to Lassa and Paulins (1995), which Kurumeh (2010) cited, one way to make basic science and technology less abstract and more interesting is to try to make the teaching-learning process more concrete and interesting. According to Eze (2006), in order to lessen the level of abstraction that is associated with basic science and technology, teaching and learning should take a more concrete approach.

The critics of contemporary education have argued that students do not comprehend fundamental ideas and principles and are unable to apply what they are taught to real-world situations Finn. Despite the difficulty of recommending a "one-size-fits-all" strategy, research demonstrates that certain practices generally encourage students to be more engaged. In recent years, the goal of basic science and technology education has been to move away from memorization and rote learning and toward more difficult, complex work that emphasizes deeper thinking; furthermore, having an interdisciplinary, instead of a departmentalized center. Utilizing ICT learning is one strategy for achieving this objective. Through an extended inquiry process based on complex, real-world questions and carefully designed products and tasks, ICT learning encourages students to acquire knowledge and skills (Moursund, 1999, Mitchelson, 2002). Practice learning has long been touted as beneficial; John Dewey is where the concept got its start. The majority of teachers are aware of the importance of engaging students in challenging projects and interdisciplinary activities that enrich and extend the curriculum. It basically aims to develop novel teaching methods that take into account the context in which children live and learn. ICT education is still in its infancy. ICT learning appears to be a good model for improving academic achievement and attitudes, according to evidence gathered over time (Meyer, 1997).

The delivery of as much information as possible is a common component of traditional instruction, such as the typical lecture-based session that originated prior to the mass production of textbooks. Because there is a lack of a traditional lecture-based approach to teaching basic science and technology, researchers and educators are participating in new research directions. Lecture, according to Moore (2006), can effectively survey the structure of knowledge in a particular area, suggest a connection between actual decision-making and cases, reach students emotionally, and provide the necessary motivation for learning difficult material. He went on to say

that one thing about the lecture method that worries people is that its effectiveness depends on the skills of each lecturer.

The study of spatial objects, relationships, formalized transformations, and the axiomatic mathematical system constructed to represent them is known as school Basic Science and Technology. According to the National Council of Teachers of Basic science and technology (NCTM, 2000), "Basic Science and Technology and spatial sense are fundamental components of basic science and technology learning," the significance of Basic Science and Technology in school basic science and technology has been emphasized. They provide methods for interpreting and considering our physical surroundings. p.41). Students can use Basic Science and Technology to understand other mathematical concepts and make connections between mathematical concepts (Mammana & Villiani, 1998; 2000 by Muschla and Muschla; NCTM, 2000). Additionally, many concepts, such as symmetry and generalization, can help students gain a deeper understanding of basic science and technology' beauty and nature (NCTM, 2000). Even if a person does not intend to become a mathematician, they still need to improve their ability to visualize and reason, as well as their appreciation of nature. To comprehend and interpret the world and our physical environment, every human being requires Basic Science and Technology intuition.

Statement of the Problem

Some aspects of the basic science and technology curriculum are difficult for many primary and secondary school students to learn. In Nigeria's secondary education system, teachers struggle just as much as students to deliver effective instruction. Students struggle to learn basic science and technology. Parents, students, educators, and educationalists have all faced difficulties as a result. Now, teachers have to figure out how to deliver effective instruction that will help students do better on both internal and external exams. It has been seen that among the variables that impact the accomplishment of students in school Arithmetic, is educators' viability as estimated through the obtaining and utilization of good educational abilities and philosophies show up exceptionally conspicuous (Max, 1988). The way a teacher teaches is very important because it affects how interested students are in the subject. This calls for the study of the impact of a ICT learning strategy on students' performance in Basic Science and Technology among junior secondary school students.

Purpose of the Study

The study is designed to achieve the following objectives:

1. To investigate the effects of ICT learning strategy on students' performance in Basic Science and Technology.
2. To investigate the difference in performance between day and boarding students when taught Basic Science and Technology using ICT learning strategy.

Research Questions

1. What are the influences of ICT learning on the academic performance of junior Secondary school students in Basic Science and Technology?
2. What is difference in the performance between day and boarding students exposed with ICT learning strategy?

Research Hypotheses

Ho₁: There is no significant difference between the mean performance scores of those taught Basic Science and Technology using ICT learning strategy and those taught with the conventional lecture method.

Ho₂: There is no significant difference between the mean performance scores of boarding and day students taught Basic Science and Technology using ICT learning strategy.

METHODOLOGY

The design of this study is quasi-experimental design. The experimental group would be subjected to the treatment (teaching using ICT learning method) while the control group would be subjected to conventional lecture method. Pretest will be administer at the beginning of the research to determine the level of group equivalence while after the treatment process posttest will be administer to determine the effectiveness of the treatment. The population of this study covered all public junior secondary school two students (JSSII) in Niger State. There are 234 public junior

secondary schools with the enrollment of 44,581 students in the study area. The Basic Science and Technology Performance Test (BTPT) was designed and used as pretest and posttest. This is an instrument developed by the researcher to examine students' knowledge on geometrical concepts before and after the treatment between control and experimental group. The test consisted of 30 multiple choice items with options A-D which was based on the topics to be covered during the treatment, one correct answer and three distracters which were all drawn from 2005-2012 JSCE past question papers to ensure that the questions meet the required standard. The instrument was validated by experts in Department of Industrial and Technology Education, Federal University of Technology, Minna respectively. After the validation exercise, their useful and constructive suggestions led to the re-framing and eliminations of some questions which were found to be either sub-standard or ambiguous. The reliability coefficient of the instrument was 0.82, this was established using Pearson Product Moment Correlation Coefficient. Basic Science and Technology Performance Test (BTPT) was administered as pretest and posttest respectively with an interval of approximately six weeks between them. The pretest was administered before the commencement of teaching using ICT learning strategy in order to determine the equivalence in students' achievement. After engaging the students with activities, then BTPT was re-arranged and administered with the aimed to measure the effectiveness of project based learning strategy. The data gathered through the achievement tests and attitude scales would be analyzed by using Statistical Package for Social Sciences 17.0. The descriptive statistics; mean, and standard deviation were used for answering the research questions while t-test was used in testing the null hypotheses.

Results Analysis

In answering the research questions, the data collected were analysed using descriptive statistics of means and standard deviations. While in analysing the null hypotheses, the data collected were analysed using inferential statistics of t-test at p-value ≤ 0.05 . The details of the analyses were in tables;

Research Question One

What are the differences between the mean academic performance scores of students taught Basic Science and Technology using ICT teaching method those taught using conventional teaching method among junior secondary schools in Niger State? To answer this question, a descriptive statistics using means and standard deviations were carried out. The result is presented in Table 1.

Table 1: Mean And Standard Deviation Between The Cloud-based Learning Strategy And Conventional Teaching Method.

Group	N	Pretest		Mean difference	posttest		
		Mean	SD		Mean	SD	Mean difference
Experimental	90	9.68	30.23		14.19	24.04	
Control	90	9.71	29.11	-0.03	9.89	11.88	4.30
Total	180						

The result in table 1 revealed that the mean performance score of the experimental group was 14.19 (SD = 24.04) and that of the control group was 9.89 (SD = 11.88). The mean performance score difference between the groups was 4.30 in favour of the experimental group. The pretest performance scores were 9.68 (SD = 30.23) and 9.71 (SD = 29.11) for the experimental and control groups respectively. The mean difference of the scores was -0.03 in favour of the control group. This showed that there was a difference between the mean performance scores of those taught using ICT teaching strategy and those taught with conventional teaching method after treatment in favour of ICT teaching method.

Null Hypothesis One

There is no significant difference between the mean performance scores of those taught Basic Science and Technology using ICT learning strategy and those taught using conventional teaching

method among junior secondary school students in Niger State. To test this hypothesis t-test statistics was employed and the result is presented in table 2;

Table 2: T-test Analysis of Mean Performance Scores of Experimental and Control Groups

Group	N	Mean	S.D	Df	t-cal.	P-val.
Experimental	90	14.19	24.04	178	6.81	0.000
Control	90	9.89	11.88			1

$p \leq 0.05$

The result in Table 2 shows that t-cal is 6.81 and p-value is 0.0001 which is significant at $p \leq 0.05$. This indicated that the null hypothesis one is rejected. Hence, there is significant difference in the mean performance scores of those taught Basic Science and Technology using ICT teaching strategy and those taught using conventional teaching method among junior secondary school students in Niger State in favour of the experimental group. **Research Question two**

What is difference in the performance between day and boarding students exposed with ICT learning strategy?

Table 3: Mean And Standard Deviation of Scores for Day and Boarding Students Exposed to Cloud-based Learning Strategy.

Group	Pretest			posttest			Mean difference
	N	Mean	SD	Mean difference	Mean	SD	
Boarding	30	6.68	18.23		11.10	16.04	
Day	30	5.71	19.05	0.97	7.89	11.28	3.21
Total	60						

The result in table 3 revealed that the mean performance scores of boarding students was 11.10 (SD = 16.04) and that of day students was 7.89 (SD = 11.28). The mean performance scores difference between the groups was 3.21 in favour of the experimental group. The pretest performance scores were 6.68 (SD = 18.23) and 5.71 (SD = 19.05) for the experimental and control groups respectively. The mean difference of the scores was 0.97 in favour of the boarding students. This showed that there was a difference between the mean performance scores of those taught using ICT learning strategy and those taught with conventional teaching method after treatment in favour of ICT learning method.

Null Hypothesis Two

H_{02} : There is no significant difference between the mean performance scores of boarding and day students taught Basic Science and Technology using ICT learning strategy.

Table 4: T-Test Analysis of Mean Performance Scores of Boarding and Day Students

Group	N	Mean	S.D	Df	t-cal.	P-val.
Boarding	30	11.10	16.04	58	4.13	0.001
Day	30	7.89	11.28			1

Table 4 showed that t-calculated is 4.13 and p-value is 0.0011 at 5% level of significant. Since p-value is less than 0.05, then the null hypothesis is rejected, which means there is a significant difference between the mean scores of boarding and day students in favour of boarding students.

DISCUSSION OF THE RESULTS

The aim of this study was to examine the effects of projects-based learning strategy on performance in Basic Science and Technology among junior secondary school students in Niger State, Nigeria. Result from the study in table 2 revealed that students taught Basic Science and Technology using ICT learning strategy performed better than those taught using lecture method. The result is in line

with that for Gültekin (2005) who investigated the effects of ICT learning in basic science and technology on fifth grade students' learning outcomes. In the study, both the qualitative and quantitative research methods were used. According to the findings, the ICT learning approach affected the academic success of students in primary education.

Result in table 4 revealed that students taught Basic Science and Technology using ICT learning strategy have positive attitude towards Basic Science and Technology better than those taught using lecture method. This result is corresponds with the finding of Meyer et.al. (1997) whose study on the effects of students' attitude and strategies on Basic Science and Technology in ICT learning. In the study, they surveyed students about their preferences for challenge, their individual academic goals, their self-efficacy about maths, and their basic science and technology strategies. Then they interviewed students about their ongoing decisions related to the challenges inherent in their maths project. It was observed that ICT learning had on positive effect on students' attitudes and self-efficacy.

In other hand, the finding of this study is contrary with the finding of Adetunde A.I and Asare. B.(2009) in their study on the comparative performance of day and boarding students in secondary school basic science and technology examination in Ghana. In the research, experimental method was used. It was found that there was no significant difference between day students and boarding students.

RECOMMENDATION

The research offered the following recommendations;

1. Secondary school teachers should be encouraged to use ICT learning strategy in the teaching of basic science and technology.
2. Parent teachers association and non-governmental organizations should be assisting secondary schools with facilities that to be used in ICT learning.
3. School managers should allocate enough time /period for basic science and technology teaching in their schools in order to have good opportunity to carry out activities related to ICT method.
4. The Federal and State Ministries of education in collaboration with other bodies such as Mathematical Association of Nigeria (MAN) and National Basic science and technology Society (NMS) should organize seminar/workshop for teachers so as to update their knowledge on the use of ICT learning strategy to improve teaching and learning in Nigeria.
5. Parent should encourage their wards to be study in the boarding' school as well as government to build more boarding schools.

CONCLUSION

This study has established that ICT learning strategy is an effective instructional strategy that can be used to improve students' performance in basic science and technology at secondary school level.

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