

Full Length Research Paper

Instructional strategies and performance of agricultural science students in Uyo High School Uyo, Nigeria

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ABSTRACT

This study investigated the effect of the use of interactive whiteboard and conventional face-to-face instructions on students' academic performance in Agricultural Science. Two objectives, research questions and hypotheses were formulated to guide the study. A non-randomized pre-test post-test experimental design was adopted. A total of 110 Senior Secondary Two Agricultural students were sampled from two intact classes in the two selected secondary schools. Agricultural Science Performance Test (ASPT) with a reliability index of 0.77 was used in generating data for the study. Descriptive statistics of Mean, Standard Deviation and Analysis of Covariance were used in analysis of data. Findings from the study showed that the use of interactive whiteboard was more effective in enhancing students' performance in Agricultural Science than the conventional instruction. Also there was no significant difference in the academic performances of male and female students. It was recommended that Government should install Interactive whiteboards in science classrooms and science teachers should be sent on training and retraining programmes regularly on the use of these smart boards.

Keywords: Interactive Whiteboard, Academic Performance, Conventional face-to-face Instruction, Agricultural Science.

INTRODUCTION

The education system is changing drastically globally, Nigeria as the giant of Africa cannot be left out in this scheme of changes. Technology is becoming more and more vital in our world of today; following this trend technology within the education system is increasing in leaps and bounds. Teachers and educators need to be ready and willing to embrace this change in order for education to be meaningful, relevant and a means of solving societal problems.

Polin (1991) in support of technological integration within the classroom asserts that computer based technology has become the essential ingredient in

restructuring learning because it can provide the diversity in instructional methods necessary to reach all school children.

When technology is effectively used in the teaching process, the value of the lesson becomes priceless as teacher-students, students-material and students-students interactions are enhanced. This increased interactivity changes the roles of the students and teacher, the teaching and learning process becomes both collaborative and integrative. (Miller et al., 2003). Furthermore, intrinsic motivation of students to learn is increased; increase which, results in an increase in

academic performance (Levy, 2003). Studies have also shown that interactive whiteboard lessons are more student centered than traditional methods, (Painter et al., 2005).

Gender issues and academic performance of students in sciences has become a recurring decimal in educational studies and research. Research findings in the past reported the dominance of male in higher achievement especially in sciences. In contrast however, some studies reported that female students are academically better than male students in social sciences Gammie and Duncan (2005). There are also a number of research studies which revealed that gender has no effect on academic performance of students in mathematics and science Ifamuyiwa and Akinsola (2008).

In Nigeria the integration of Information and Communication Technology (ICT) tools in the science classroom is faced with several challenges even with the intervention pilot scheme of the Federal Government in the Federal Government colleges in 1987, the story has not changed. In Akwa Ibom State the availability and usability of Interactive Whiteboard (IWB) is still an issue though some private schools and Federal Government Colleges have already integrated this technology in their classrooms. The traditional approach of expository and note taking is gradually losing its effects as technology is advancing in the education system. One of the recent entrances of technology into the classroom setting is the Smart board or interactive white boards. These smart or white boards are based on computer technologies which are fast replacing the traditional or conventional modes of teaching.

An interactive whiteboard also referred to as smart board is a piece of hardware that looks much like a standard white board but it connects to a computer and a projector in the classroom to make a very powerful technological tool. The interactive Whiteboard becomes a giant, touch-sensitive version of the computer screen. Instead of using the mouse, the computer is controlled through the interactive whiteboard screen just by touching it with a special pen. Anything that can be accessed from your computer can be accessed and displayed on the interactive whiteboard. For example word documents, power point presentations photographs, video clips, websites or online materials.

Special soft wares in various subject areas are also included within the interactive whiteboard. With this, one can interact with images and text projected on the board, clone, color, label, rearrange and change their sizes.

Wall (2005), aimed to gather the opinions of primary school pupils about interactive whiteboards and to identify the effects of these tools on teaching and learning. The students listed benefits such as, easier comprehension, higher concentration, improved students participation, more effective presentation of information, aiding memory. They also added that interactive

whiteboards had more positive effects in mathematics and science classrooms when compared to the English class. The question however is 'what is the effect of interactive whiteboard on the achievement of Agricultural Science students in Uyo High School?'

The purpose of the study was thus to determine the effect of the use of interactive whiteboard on secondary school students' academic performance in Agricultural Science. The study also sought to determine if there was difference in the academic performance of male and female students taught with interactive whiteboard. The following research questions were therefore postulated:

1. How does the use of interactive whiteboard affect the academic performance of students in Agricultural Science?
2. Is there any difference between the academic performance of male and female students taught with the interactive whiteboard?

RESEARCH METHODOLOGY

The study adopted a non- randomized pre-test post- test experimental design. The study covered all the thirteen secondary schools in Uyo LGA. Agricultural Science students' population was two thousand one hundred and four (2,104).

Two secondary schools were selected using criterion sampling technique. The major criteria were the availability of a functional interactive whiteboard. A sample of 110 students consisting of 56 boys and 54 girls from two intact classes in the selected schools was used for the study. Each class was assigned as control and experimental group. One researcher's made instrument: Agricultural Science Performance Test (ASPT) was used for data collection. The ASPT consisted of 25 multiple choice questions constructed on the topic fractional distillation process.

To ensure the reliability of the instrument, results obtained from a trial testing group of 10 students was subjected to Kuder Richardson Formula 21 and reliability co-efficient of 0.77 was obtained.

SS2 Agricultural Science teachers in the two selected schools served as research assistants. The researchers prepared a power point lesson package on farm mechanization. Colorful internet diagrams of the farm machines were also in co-operated into the package. Pre-test was given to the two groups at the same time and the results obtained. The control group was taught with the conventional face-to face instruction while the experimental group was taught with the interactive whiteboard using the lesson package developed by the researchers. A post test was administered on the two groups for 20 minutes one week after the treatment. The research questions were answered using descriptive statistics of Mean, Standard Deviation and while the

Table 1. Adjusted Mean scores of Student Taught Using interactive Whiteboard and those taught without.

Strategy	N	Pre-test	post-test	SD	mean gain
		\bar{X}	\bar{X}		
Using Interactive Board	57	9.88	15.37	0.57	5.49
Using conventional face-to-face.	53	12.87	14.28	0.61	1.42

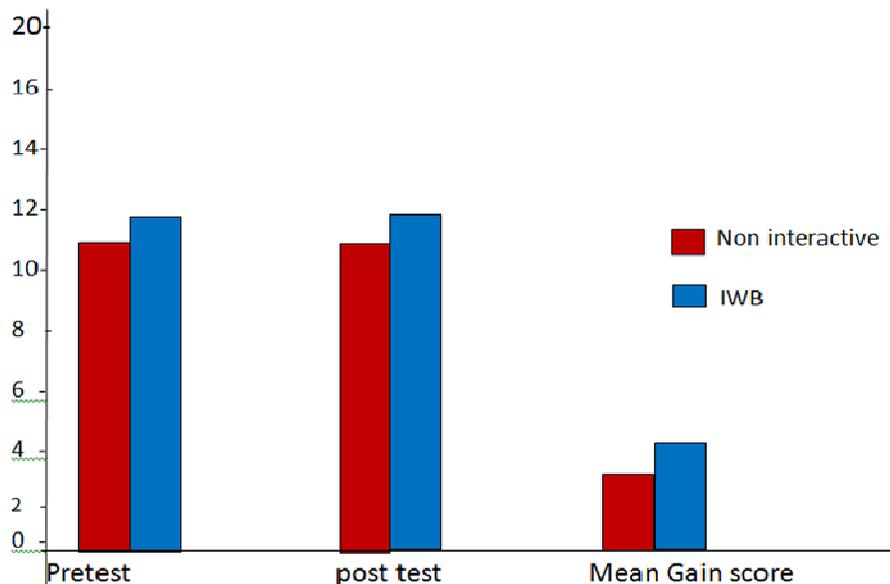


Figure 1. Graphical illustration of students' academic performance based on strategy.

hypotheses were tested with Analysis of Covariance at 0.05 level of significance.

RESULTS

Answering the research questions

Question 1: How does the use of interactive whiteboard affect the academic performance of Agricultural Science students?

As shown in table 1, the adjusted mean of students that were taught using interactive board is 15.37 while those taught using non interactive board is 14.28. This implies that the adjusted mean score of students taught using interactive board is greater than that of those taught using conventional face-to-face instruction. This is as illustrated in figure 1. In order to determine if the difference is significant, the scores were subjected to the Analysis of Covariance.

Question 2: What difference exists in the mean performance scores of male and female students taught using interactive whiteboard?

As showed in table 2, the adjusted mean of male students taught using interactive board is 15.21 while that of female students taught using interactive board is 15.52. This implies that adjusted mean score of female students taught using interactive board is greater than that of male students. This is illustrated in figure 2. In order to determine if the difference is significant, the scores were subjected to the Analysis of Covariance.

Testing of hypotheses

Hypothesis 1

There is no significant difference in the mean performance scores of Agricultural Science students taught using interactive whiteboard and those taught with conventional face-to-face instruction.

As shown in Table 3, the calculated P-value.032 of the main effects of strategy is less than the alpha level of 0.5 therefore, the null hypothesis is rejected. This implies that there exists significant difference in the mean performance scores of Agricultural Science students

Table 2. Adjusted mean scores of male and female students taught Using Interactive Whiteboard.

Gender	N	Pre-test	Post-test	SD	main gain
		\bar{X}	\bar{X}		
Male	28	10.14	15.21	0.15	5.07
Female	29	10.13	15.52	0.15	5.39

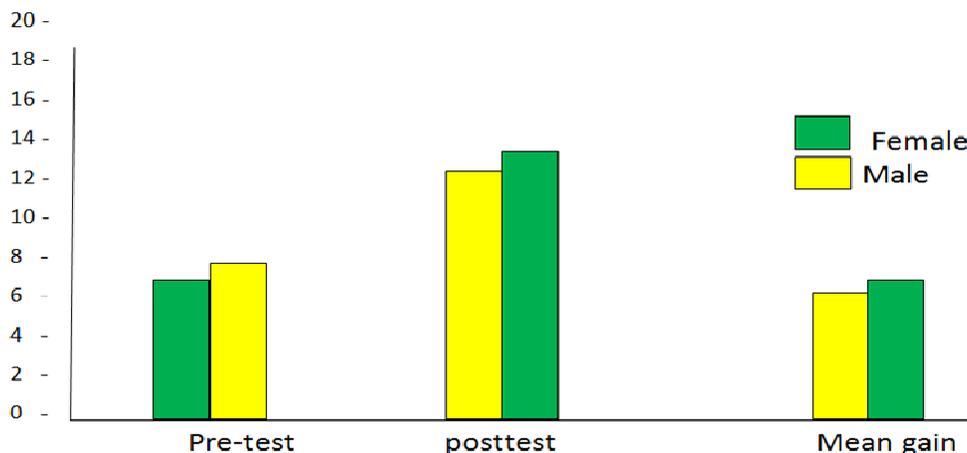


Figure 2. Graphical representation of male and female students' performance in chemistry.

Table 3. Covariance Analysis (ANCOVA) of Posttest Scores of Student Taught Using Interactive Whiteboard and those Taught Without.

Source	Sum of Squares	df	Mean Square	F	Sign@Decision	p<.0
Pre-test	31.88	1	31.88	3.96	.049	*
Main effects Interact	38.00	1	38.00	4.73	.032	*
Model	69.88	2	34.94	4.34	.015	*
Residual			860.50	107	8.04	
Total			930.37	109	8.54	

*=Significant at P<0.05 alpha

Table 4. Covariance Analysis (ANCOVA) of posttest Score of Student Taught Using Interactive whiteboard and those taught Without.

Source	Sum of Squares	df	Mean Square	F	Sign@Decision	p<.05
Pre-test	.96	1	.096	.015	.905	NS
Main Effects Gender	1.289	1	1.289	.196	.660	NS
Model	1.384	2	.692	.105	.900	NS
Residual	355.879	54	6.590			
Total	357.263	56	6.380			

NS=Not Significant at P<0.05 alpha

taught using interactive whiteboard and those taught without.

Hypothesis 2

There is no significant difference in the mean performance score of male and female students taught

using interactive whiteboard.

As shown in table 4, the calculated P-value. 660 of the main effect of strategy are greater than the alpha level.0.5. Therefore, null hypothesis is retained. This implies that there is no significant difference in the mean performance scores of male and female students taught using interactive whiteboard

DISCUSSION

The result as shown in tables 1 and 3 in terms of utilization of interactive board and academic achievement shows that there exists a significant difference in the academic performance of students. Those taught with IWB, performed better than those taught without. These findings may be due to increased motivation and interest to learn as students were allowed to interact with the whiteboard.

This finding supports those of Levy (2008) who noted that positive gains were realized in literacy, mathematics and science for children age 7-11. The research findings is also in line with Little (2004) who reported that students taught geometry with interactive whiteboard performed better than those taught with traditional method. However this finding is at variance with Higgins, (2007) who after a two year study found no significant difference in test score between students in school using IWB.

Another area of concern of this study was to find out the effect of gender on students' academic performance when taught with IWB. The results on tables 2 and 4 indicated that the adjusted mean score of male students taught using IWB was greater than that of females; however the difference was not significant. This finding is consistent with the studies of Kost, Pollock and Finkelstein (2009); Ifamuyina and Akinsola (2008); Gambari (2010) who revealed that there is no significant difference in performance of male and female students in mathematics and physics concepts respectively.

CONCLUSION

The current approach to learning is rapidly advancing technologically as the physical teacher is no longer playing a vital role in students learning and academic achievement. Technological advances like the interactive whiteboard creates opportunities for students to interact with learning materials thereby enhancing students' performance. The use of the IWB also seems not to discriminate against gender.

RECOMMENDATIONS

Based on the research findings, the following recommendations were made:

1. Interactive white boards or smart boards should be installed in the science classroom, in view of its stimulating and positive effect on students' academic performance.
2. Akwa Ibom State Government should invest in this technology and teachers should be sent for training and retraining programmes to ensure maximum use of the technology.

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