

The Effects of Using an Interactive Whiteboard on Undergraduate Students' Academic Achievement

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Abstract: *This study examined the effects of the use of an interactive whiteboard on the academic achievement of Nigerian undergraduate students, after a 13-week exposure to an elective course in Educational Technology. 38 students participated in the study. One major null hypothesis was formulated and tested. The research was designed as a pre-test, post-test control group quasi-experimental study. T-test was employed for the data analysis. The findings showed that there was no significant difference in the academic achievement of the students in the experimental group who were taught using the conventional lecture method combined with the interactive whiteboard, and the control group who had same lessons using the conventional lecture method only. Although, the use of interactive whiteboard has not significantly affected students' achievement, it was realised that students become more engaged, committed, receive significant attention and interacted more with their peers and lecturer. Based on the findings, appropriate recommendations were made.*

1. INTRODUCTION

The entire world (including the developing countries) is witnessing digital revolution. It has been noticed that different nations and societies are experiencing the pervasive use of technologies such as the internet, social networking tools, cell phones, video games and e-mails to mention but a few, not only for communication purposes, but to make life easier.

With reference to education, it has been observed that there is a wider application of computers to instruction. This is noted mostly with simulations and games, e-books, virtual environment and multimedia utilisation. The use of multimedia in particular has made lesson presentations to become more interesting and lively. The latest technology in vogue (spanning almost 20 years) that has replaced the traditional black or white boards is the interactive whiteboard.

Interactive whiteboards were originally developed for office settings and are a relatively new addition to education (Smith, Higgins, Wall and Miller, 2005). Sometimes; they are referred to as Smart boards or electronic whiteboards. They are devices that connect to a computer, a multimedia projector and a touch screen electronic whiteboard. The user can control and manipulate this projected image through the software installed on the computer. For effective use, the interactive whiteboard must be oriented.

2. LITERATURE REVIEW

It must be stated that interactive whiteboards are being integrated into many classrooms especially in Great Britain and the United States (Digregorio and Sobel-Lojeski, 2010). Schroeder (2007) stated that much of the research on interactive whiteboards comes from Great Britain as the technology is part of a \$27 billion initiative to update all primary and secondary schools by 2015. It must also be mentioned that most researches on the use of interactive whiteboard were carried out, using mostly primary and secondary school students. Also, research attention on the use of interactive whiteboard was paid to the teaching of Maths and Science. Very few studies were researched into with tertiary education level students, particularly in the developing countries.

Digregorio and Sobel-Lojeski (2010) carried out an extensive literature review on common themes on interactive whiteboard. These include attention, behaviour, and level of interaction between students, teacher and interactive whiteboard as well as achievement. Higgins et al. (2007) carried out a 2-year longitudinal study on the effect of interactive whiteboard on achievement. No significant difference was found in the test scores between schools using interactive whiteboards and schools not using

them. Similarly, Schuck and Kearney (2007) revealed in their findings that little or no difference was found on national test scores in Mathematics and Science in U.K. primary schools when comparing interactive and non-interactive whiteboard classrooms. Martin (2007) and Solvie (2007) also presented supporting reports.

Notwithstanding the above, Thomson and Flecknoe (2003) pointed out that there was significant gain using the ready made using the interactive whiteboard program called *Easiteach Maths*. In the study conducted by Lewin et.al. (2008), they realised that students had positive gains in literacy, mathematics and science for children aged 7-11. This was due to the length of time that students had been taught using the interactive whiteboard.

3. RESEARCH METHODOLOGY

3.1. Hypothesis

There will be no statistical difference in the achievement of students taught using the interactive whiteboard and those taught using the conventional lecture method.

3.2. Design

The study adopted a pre-test, post test control group quasi-experimental design. In other words, the subjects were measured with respect to the dependent variable both before and after the experimental study. The interactive whiteboard is the independent variable, whereby the effects on learning were examined. The control group were taught using the conventional lecture method, while the experimental group were taught through the conventional lecture method, but also using the interactive whiteboard. The academic achievement is the dependent variable of the study. This was measured in both groups with a pre and post tests. However, the experimental group also had an open-ended six-item questionnaire, which sought their views on the use of interactive whiteboard for learning.

3.3. Subject

The study was conducted using 200 level students who registered for an elective course in educational technology in the Faculty of Education, Northwest University, Kano, Nigeria. A total number of 38 students enrolled for the course. This was made up of 18 females and 20 males.

3.4. Instruments

The first instrument for this study was an academic achievement test on educational media constructed by the researcher. Two equivalent forms were prepared for the pre-tests and the post-tests. There were 25 questions in each test. In preparing the questions, the researcher took into account the Bloom's taxonomy. The questions were given to a colleague for content validity, which resulted in re-framing of some items. The reliability co-efficient was 0.88

In addition, a questionnaire titled 'Students attitude towards the use of interactive whiteboard for learning' was prepared and given to the experimental group. The instrument was content validated and the reliability co-efficient was found to be 0.78

3.5. Procedure

The experimental and control groups were given the academic achievement test (pre-test) before the treatment. The treatment lasted for 13 weeks this involved teaching each group same topics, but adopting different techniques. At the end of the 13th week, there was the second application of the post-test. Immediately after this, the experimental group were given the attitude questionnaire to complete.

4. RESULTS

This section presents an analysis of the data gathered. The table below shows the academic achievement pre-test mean scores and standard deviation values.

Table1. Pre-test; Mean scores and Standard Deviation values of the two groups

Groups	N	X	S.D
Control	19	41.54	8.87
Experimental	19	41.72	9.99

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The table above indicated that the achievement test mean score of the control group before the experiment was 41.54, while that of the experimental group was 41.72. This is an indication that the achievement levels of both groups were similar at the start of the study. The difference between the mean scores was -0.18. A t-test was conducted to determine the significance of the difference between mean scores of the groups. This is illustrated in table 2 below.

Table2. *T-test results of Pre-test mean scores*

Groups	N	X	S.D.	T	Df	P
Control	19	41.54	8.87	-0.169	36	0.734
Experimental	19	41.72	9.99			

The t-test result shown in table 2 above revealed no significant difference ($p>0.05$) between pre-test mean scores of both groups. This further buttressed that the initial achievement levels of the groups were similar. The post-test mean scores of groups after the experiment is presented in table 3.

Table3. *Post-test Mean scores and Standard Deviation values of the two groups*

Groups	N	X	S.D
Control	19	72.50	13.62
Experimental	19	77.51	10.98

Table 3 shows the post-experimental mean achievement scores of the control and experimental groups. The mean score of the control group was 72.50; while that of the experimental group was 77.51. The difference between the post-test scores of the groups was $72.50 - 77.51 = -5.01$.

Table4. *T-test results of post-test mean scores*

Groups	N	X	S.D	t	Df	P
Control	19	72.50	13.62	-1.754	36	0.432
Experimental	19	77.51	10.98			

Table 4 above shows the results of the independent t-test conducted to determine the significance of the difference between mean scores. The table revealed no statistical significant difference in the post-test mean scores of both groups ($P>0.05$). Hence, the null hypothesis which states that "there will be no statistical difference in the achievement of students taught using the interactive whiteboard and those taught using the conventional lecture method" is upheld. In essence, the use of the interactive whiteboard did not significantly increase students' academic achievement in the course (Educational Media).

As stated earlier, the experimental groups were further given an attitude to the use of interactive board for learning questionnaire. This is an open-ended six –item questionnaire soliciting for their view on the use of the board, whether it helps them to learn more as well as the challenges they faced when it was adopted for teaching. Their views are summarised thus:

The use of interactive whiteboard motivates me to learn in class. It makes me to be an active learner I was really happy that I was participating in the lessons. Learning is fun, exciting and enjoyable: and not boring. I hardly believe that 2 hours has gone so soon. I would love to learn all my courses using the interactive whiteboard. However, some of us who are not technological minded were finding it difficult doing some exercises on the screen.

5. DISCUSSION

From the findings, it was revealed in table 4 that there was no significant difference in the achievement of students taught with the use of interactive whiteboard and those taught using only the modified lecture method. Though, there was no significant difference, table 3 revealed that the experimental groups had higher academic achievement scores and also a higher mean gain score.

Although, it was realised that the use of interactive whiteboard had not increase students' academic achievement significantly, however, it has contributed positively in no small measure to learning. This could be seen in the area of students' participation in class, making teaching student-centred, motivating them to learn and thereby making them to be more committed to learning. This view was supported by Higgins et.al (2007) when they stated that interactive whiteboards has been found to have a positive effect on students' motivation to learn. Glover et.al (2005) however emphasised that if students interact with the board themselves, motivation and attention can also be increased. In

addition, use of interactive whiteboard made learning to be fun for the students. There was no boredom because different activities were being carried out.

6. CONCLUSION

This study focused on the effects of the use of interactive whiteboard on university undergraduate students' academic achievement when exposed to a 13-week course on educational media. The research revealed no significance difference between academic achievement scores of the experimental and control groups.

A previous study by the researcher examining the attitude of the students towards the use of interactive whiteboard for learning revealed that students do develop positive attitude to learning virtually all their courses with the adoption of the interactive whiteboard. Though, it can be seen from this study that it has not increased academic achievement, however, its unique contributions to learning cannot be undermined. New teaching and learning activities emanates from its utilisation.

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