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Influence of Interactive White Boards on Students Academic Achievement in Mathematics in American University of Nigeria Academy

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ABSTRACT

This study examines the influence of interactive white boards on students' academic achievement in American University of Nigeria Academy. The survey research method was used. The population of 10 teachers and sample of 90 students are randomly selected from the population of 258. Questionnaire is constructed on 4 point likert scale and was used for data collection. Mean score and standard deviation are used to answer the three research questions. The result shows that there is availability of Interactive White Boards in American university of Nigeria Academy and the use of the Interactive white boards in teaching mathematics has improved student academic achievement. Recommendation among others are, the school administration should organize workshop and seminar for mathematics teachers to update them on the new skills on the use of interactive whiteboards in teaching mathematics, students should be permitted to use the interactive white boards in collaborative learning in order to enhance their understanding.

Keywords: *interactive white boards,*

INTRODUCTION

In recent years, interactive whiteboards (IWBs) have moved from being considered a novelty into a regular part of the equipment of many classrooms, especially in the United Kingdom, and in other countries of Western Europe, North and Central America, South East Asia, and Australia (Swan, Schenker, Kratcoski and van't Hooft, 2010). Interactive white boards provide interesting opportunities for students and teachers alike to interact with digital content in a multiperson learning environment.

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This study wants to critical analyze the influence of interactive white boards on students' academic performance in mathematics in American University of Nigeria Academy, with a view to identifying strong and weak points. Interactive whiteboards connect a computer—linked to a data projector—and a large touch-sensitive board that displays the image projected from the computer and allows direct input and manipulation through the use of fingers or styli. Software provided with the boards offers additional functions that improve the facility to control the computer at the touch of the screen (Smith et al, 2005). As Beauchamp and Parkinson (2005), Kennewell (2006), Mercer *et al.* (2010), have noted, these additional functions include the following:

(i) Drag and drop: moving around screen items to allow classification, processing, comparison, ordering of terms, and so forth;
(ii) Hide and reveal: allowing ideas to be shown gradually so that conceptual development takes place, and elaborating the development of hypotheses;
(iii) Colour, shading, and highlighting: emphasizing similarities and differences, enhancing explanations, and allowing reinforcement through greater emphasis;
(iv) Multiple visualization: matching different ways to present an issue;
(v) Multimedia presentation: replicating non digital technologies such as overhead projectors, slide projectors, and video players;
(vi) Manipulation of objects from other technologies and software: displaying objects elaborated in other types of software and operating with them;
(vii) Movement or animation: demonstrating principles and illustrating explanations;
(viii) Indefinite storage and quick retrieval of material: saving previous work as personal files and using them for revision, support, and further development.

These features, combined with a display large enough for a whole class to see clearly, provide teachers with opportunities for access to a rich blend of diverse, multimodal resources, for manipulation and exploration and for increasing class participation.

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As a result, Interactive white boards are claimed: "to have the potential to enhance demonstration and modelling; to improve the quality of interactions and teacher assessment through the promotion of effective questioning; to redress the balance of making resources and planning for teaching; to increase the pace and depth of learning" (BECTA, 2004). Mercer et al (2010) stated that "the Interactive white boards allows a flexibility in the marshalling of resources that enables teachers to create interesting multimodal stimuli for whole-class dialogue much more easily than do other technologies".

Interactive white boards have been found to be particularly useful in teaching mathematics. Glover et al (2007) affirmed that an Interactive white boards still has the potential to transform mathematics teaching, and in many cases it clearly has done so. The large-scale study by Somekh et al (2007) revealed that with more exposure to Interactive white boards in mathematics pupils on average made greater progress. Mathematics has always been, and is still, a subject of considerable importance in schools; it is also a subject in which educational technologies are frequently employed, in part because the teaching of mathematic topics may greatly benefit from multiple representations and animations, and in part because a great deal of software for mathematics instruction is available (Torff & Tirotta, 2010).

As reported by different authors, in the UK, USA, Canada, Australia, and other countries, Interactive white boards are increasingly being used in mathematics instruction both in primary and secondary education (Bruce et al, 2011; Miller & Glover, 2010; Schenker et al, 2010; Zevenbergen & Lerman, 2008). In 2005, a national survey in England found that nearly half of all primary school teachers (49%) had already made use of Interactive white boards in their mathematics teaching; in secondary schools, 77% of mathematics teachers used Interactive white boards in their lessons (Kennewell et al, 2008).

Often mathematics lessons show a lack of variety, with typical lessons concentrating on the acquisition of skills, the solution of routine exercises and preparation for tests and examinations (Ofsted, 2008). In mathematics education, it is commonly claimed that the use of multiple

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representations and the flexibility to switch between them is an important component in mathematical thinking, learning, and problem solving. Heinze et al, (2009) stressed how "instructional environments wherein learners are confronted with multiple representations of a given mathematical concept, principle or situation, and wherein they learn to switch fluently and flexibly between these various representations, are considered as more effective in enabling learners to understand and apprehend mathematical notions and to develop a genuine mathematical disposition than environments that do not emphasize multiple representations".

Given its previously described affordances, Interactive white boards' technology provides an innovative tool with high potential for mathematics instructional environments. Teachers can use Interactive white boards for modelling mathematical ideas and strategies, demonstrating theorems, explaining difficult concepts, stimulating discussion about relevant mathematical topics, inviting interpretations of what is displayed, and challenging students to apply their mathematics to solve problems (Miller & Glover, 2007). Good practice in mathematics education includes the use of high quality diagrams and relevant software to support learning through, for example, construction of graphs or visualization of transformations (Miller & Glover, 2010; Moss et al, 2007).

The Interactive white boards affordances, especially the capacity to present a wide variety of multimedia resources, the ability for movement and animation to demonstrate principles and to illustrate explanations, the possibility to match different representations (geometrical and algebraic) may favour enhancements in teaching and learning (Higgins, Falzon, Hall et al., 2005; Torff & Tirotta, 2010). Furthermore, mathematics learning is an essentially constructive activity. Learners need to engage in the processes of mathematical thinking: framing and solving problems, looking for patterns, making conjectures, examining constraints, abstracting, inventing, explaining, justifying, challenging, and so forth (Schoenfeld, 1992). In this respect, the interactive affordances of the Interactive white boards can be exploited to promote the learners' active involvement in these mathematical thinking processes

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through the use of a more interactive pedagogy. Mathematics education is one of the domains in which Interactive white boards' technology may be most beneficial. Consequently, it is one of the domains that has received most attention in Interactive white boards research, our literature review focuses on studies of mathematics teaching through Interactive white boards. The main underlying question of this review is to find out whether the use of Interactive white boards in classrooms have influence on the performance of students in mathematics, and whether this improvement enhances student understanding of basic concepts, encourages idea generation, and better promotes students' achievements.

The purpose of this study is to find out the influence of Interactive white boards on students academic performance in Mathematics in American University of Nigeria Academy.

The specific purposes for this study are:

i. To determine the availability of interactive white board in American University of Nigeria Academy.
ii. To examine the influence of interactive white boards on students attitudes toward learning mathematics in American University of Nigeria Academy.
iii. To determine the influence of interactive white board on students academic performance in Mathematics.

The following research questions were formulated for the study:

i. Does the availability of interactive white board in American University of Nigeria Academy influence Students Academic Achievement?
ii. Does interactive white board influence students attitude toward learning mathematics in American University of Nigeria Academy?
iii. Does the use of interactive white board have influence on students' academic performance in Mathematics American University of Nigeria Academy?

METHOD

This research adopts a survey method. The research population involved the 10 mathematics teachers, and 90 students randomly selected from

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the population of 258 students of American University of Nigeria Academy. The age of teachers ranges from 26 years to 43 years with the years of teaching experience in Mathematics ranging from 4-10 years, while the age of students ranges from 10 years to 20 years.

The researcher designed two types of questionnaire for the respondents (students and teachers) on the important of Interactive white boards on students' academic achievement in mathematics. The two instruments consist of 10 items each. This 10 item questionnaire was constructed and scored on 4 –point Likert's -like options that is 4 = Strongly Agree, 3 = Agree, 2 = Disagree and 1 = Strongly Disagree and was administered to the teachers and students of American University of Nigeria.

The researcher personally administered the questionnaire to the respondents (students and teachers) of American University of Nigeria Academy on the influence of Interactive white boards on students' academic achievement in mathematics. The entire administered questionnaire were filled and retrieved successfully. The data were analyzed using mean and standard deviation. The real limits of the assigned values of response categories are used to take decision for answering the research questions. The limits of the response categories of the 4-point rating scale as shown below.

The mean of 4-point rating scale, $\bar{X} = \sum \frac{X}{N}$

$$\bar{X} = 4 + 3 + 2 + 1 = \frac{10}{4} = 2.5$$

The decision rule to accept or reject an item is determine by the mean level of acceptance. From the mean, we accept if the mean level of acceptance of an item is equal to 3.0 and above, and rejected if the mean level of acceptance is less than 3.0

RESULTS AND DISCUSSION

Results from table 1 show that the mean level of the availability of interactive white board for teaching Mathematics in American University of Nigeria Academy is greater than 3.0, we there for accepted that there

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is availability of interactive white board for teaching Mathematics in American University of Nigeria Academy, but not all the teachers are using it because some of the mathematics teachers are interactive white boards illiterate. Table 2 shows that the mean level of all the items is greater than the decision rule limit of 3.0, we therefore concluded that interactive white board has positively motivated the students' attitude and makes them to have more interest and attention toward learning mathematics in American University of Nigeria Academy. Table 3 has clearly shown that the mean level of all the items to answer this question is greater than 3.0; we therefore accepted the fact that use of interactive white board in teaching Mathematics in American University of Nigeria Academy has influence on students' academic performance.

The result of the study revealed that there is availability of interactive white board in American University of Nigeria Academy and the use of this interactive white board motivates student learning ability and makes mathematics easier. The interactive white board has positive influence on students' academic performance in Mathematics in American University of Nigeria Academy because it increases students' capacity of solving mathematics problem. This then implies that teachers should re-direct their attitude towards the use of interactive white board in teaching Mathematics which will eventually increase students' performance.

Table 1: Availability of interactive white boards in American University of Nigeria Academy

S/N	Items	Mean	Decision
1.	Every class has efficient interactive white boards for teaching mathematics.	3.57	Accepted
2.	All mathematics teachers uses interactive white board in teaching.	1.88	Rejected
3.	All the mathematics teacher are interactive white boards literate.	2.84	Rejected

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Table 2: Influence of Interactive white boards on students attitudes toward learning mathematics in American University of Nigeria Academy

S/N	Items	Mean	Decision
1.	Interactive white boards increases learners motivation in learning mathematics.	3.17	Accepted
2.	Interactive white boards encourage students to pay more attention in mathematics lesson.	3.14	Accepted
3.	Learning mathematics becomes easier and faster when using interactive white boards.	3.21	Accepted
4.	Mathematics become more enjoyable when using interactive white boards to teach.	3.24	Accepted

Table 3: Influence of Interactive white boards on students' academic performance

S/No.	Items	Mean	Decision
1.	Mathematics examination becomes simpler because of the use of interactive white boards in teaching.	3.30	Accepted
2.	Students capacity of solving mathematics problem has been improved through the use of interactive white boards.	3.48	Accepted
3.	Students understand mathematics easier through the use of interactive white boards.	3.12	Accepted
4.	Generally, interactive white boards improve the performance of students in mathematics.	3.42	Accepted

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CONCLUSION AND RECOMMENDATIONS

Mathematics is an abstract subject that requires a lot of practice on the part of the students for better understanding. Based on the finding, the study concluded that using interactive white board in teaching mathematics has improved students academic performance .From the result of the finding, interactive white board increase learners' participation and enhanced collaboration and should therefore be adopted fully for effective and meaningful teaching and learning of mathematics. The following recommendation were made based on the findings

1. The schools administration should organize workshops and seminar for teachers in other to train and update them on the use of interactive white board in teaching mathematics.
2. Mathematics teachers should make deliberate effort to prepared lesson plan ahead of time and use interactive white board in delivering the lesson.
3. Students should be permitted to use the interactive white boards in collaborative learning in order to enhance their understanding.

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