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IMPACT OF SMART BOARD IN PROMOTING POSITIVE ATTITUDE OF STUDENTS TOWARDS THE LEARNING OF MATHEMATICS IN KOSOFE LOCAL GOVERNMENT AREA OF LAGOS STATE

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ABSTRACT
Many teaching methods and strategies have evolved as a result of research efforts in solving the general problems of poor performance in Mathematics. It is a global phenomenon which is not peculiar to Nigerian society alone. Researches at local and international domains have also reported a negative attitude of students towards Mathematics. This study considered a teaching approach of instructional presentation with smart board technology that may elicit interest of students in Mathematics in order to attain a paradigm shift from a negative attitude to a positive attitude. The pre-test, post-test control group quasi-experimental design was adopted for the study. Two private secondary schools were purposively selected from Kosofe Local Government Area of Lagos state. Intact classes were used for control and experimental groups. The experimental group comprised 20 students while the control group has 15 students, making a total of 35 students. Students' Attitude Towards Mathematics (SATM) with 20 items was the attitude questionnaire used for data collection. SATM was given to Mathematics educators and expert researchers for validation. 20 students outside the study were used for pilot study and the internal consistency of the instrument was found to be; r = 0.81. Two research questions raised were answered after analysis with descriptive statistics. The three hypotheses formulated were tested at 0.05 level of significance with the use of Analysis of Covariance (ANCOVA). The findings showed that the use of smart board culminated in better students' attitude towards Mathematics. There was significant main effect of treatment on students' attitude to Mathematics. The study concluded that the use of smart board has the potential to improve the attitude of students towards Mathematics. The study recommended that the school management should provide smart board for the teaching of Mathematics and also train teachers on its use.

Keywords: Attitude, Impact, Mathematics, Smart board, Technology.

INTRODUCTION
Attitude is the hallmark of its tenacity in whatever an individual does. It is the attitude that determines the altitude. According to Nurture land (2018), attitude can be considered as the disposition toward a

course, idea or situation which may be positive or negative. That means attitude is a construct which can be measured or described directionally as positive or negative. There are many factors that can determine the attitude of a learner towards a subject, particularly Mathematics that is often dreaded. These may include the teacher factors, parental factors, environmental factors (Davadas and Lay, 2017). In other words, these factors could be social, natural or infrastructural environmental, peer group factors, instructional resources, societal factors (Mensah and Frimpong, 2020; Anghelache, 2013) and policies that are in place.

Technology tools can affect attitude formation in learning. Beyond simple technological tools, there are more enhanced gadgets like radio, television, projectors, tape recorder and computer that have been in educational use. Technology has become pivotal instrument in all human endeavours. Tataroglu and Erduran (2010) observed that technology has permeated majority of man's activities. Every nation and race has technology of their own to meet their needs. In the present world, technology has advanced and it has become essential instrument which are made use of in many aspects of our activities. Any aspect of human endeavours that is driven by technological innovation grows faster than those that are conservative to the use of technology. Technology has found its way into commerce, industry, military, security, education, medicine and many other aspects of our lives.

Technology in education is adopted in administration as well as in teaching and learning. Technology in teaching could be in form of instructional materials of various types or in instructional presentation. Afolabi and Animasahun (2013) citing Agggarwal (2001) emphasized the importance of attractive presentation of materials to be learnt, stating that if contents are presented attractively, it has the psychological potency to motivate the learner and thus induce positive attitude. Technology helps to do so in a simple and better way.

Muhanna and Nejem (2013), Reimer and Moyer (2005) reported that many researches have consistently found that smart board technology engenders students' commitment to the task at hand and thus, improves the learning skills of the learners. Muhanna and Nejem (2013) also found out in their own study that students participate more, involve in mathematical thinking and also learn Mathematics with fun. In their study on teachers' attitude towards the use of smart board, they found out that teachers' qualification was statistically significant in favour of teachers below five years of experience while their gender is not statistically significant.

In the studies by Akar and Karakas (2020) and Batdt (2017) it was found that smart board makes Mathematics learning a fun and it increases interactions between teacher and student, while Bozkus and Karacabey (2019) added that it increases concentration, and motivation towards the lesson. With a lot of research on Mathematics education, few of these researches addressed the aspect of instructional presentation. According to Lacina (2009), empirical, research studies on the benefits of using technology as an instructional tool are still few. Therefore, it is needful to consider the importance of instructional presentation mode as smart board. On this account, this study examined the impact of instructional presentation in Mathematics with smart board on students' attitude towards Mathematics.

This study is premised on Brunner (1966) theory of presentation of knowledge. Brunner identified three modes of structural presentation of content to be learned. These are the inactive mode, the iconic mode and the symbolic mode (Afolabi, 2010). The inactive relates with the learner doing an activity which will enhance learning. The smart board gives room for learners' participation. The iconic level considers structural presentation of knowledge through presentation of the picture or image of it. The facilities embedded in smart board enables the teacher to make relevant and appropriate illustration. He can retrieve, store, copy and paste, enlarge or reduce size of objects easily with the use of smart board.

There are many research areas in Mathematics education. It is imperative to harness the opportunity offered by technology advancement into Mathematics instruction. Technology in teaching has been reported to enhance positive attitude of teachers and students. Motivation and participation have increased due to the use of some technology. Consequently, greater achievement has been achieved. Instructional presentation is vital to the learners' attitudinal disposition whereas, this aspect has been with little research. For this reason, there is need for careful selection of appropriate medium of lesson presentation. The purpose of this study is to consider how much the use of smart board can affect the attitude of students when the teacher uses this technology. For this reason, the study examined the impact of the smart board in improving students' attitude towards toward Mathematics.

The following research questions were considered in the study:

i: What are the mean differences in attitude of students who were taught Mathematics with smart board and those who were taught Mathematics with chalkboard?

ii What are the mean differences in the attitude of male and female students who were taught with smart board and those who were taught with chalkboard?

The following research hypotheses were tested for the study:

HO_1: There is no significant main effect of treatment on students' attitudes toward Mathematics.

HO_2: There is no significant effect of gender on students' attitude towards Mathematics.

Ho_3: There is no significant interaction effect of treatment and gender on students' attitude towards Mathematics.

METHODOLOGY

This is a nonequivalent "control group" design, because the control and experimental group have different sample size and different treatment (Cohen and Manion, 1989; Iji, Okoronkwo, &Anyor, 2019). The research design is diagrammatically represented below:

O1	X1	O3	experimental group	(E1)
O2	X2	O4	control group	(E2)

Where O1, O2 represent the pre-tests for the experimental and control group respectively and O3, O4 represent the post-tests for the experimental and control groups respectively.

X1, X2 are treatments involving experimental group E1 and control group E2. respectively

There are one independent variable teaching method (at two levels- experimental and control groups) and one dependent variable, which is students' attitude towards Mathematics.

There are 63 private secondary schools in Kosofe Local Government Area of Lagos state. Two private schools far apart were purposively selected in this LGA. Two intact classes of senior secondary class II (SS II) were randomly selected as control group and experimental group. The control group had 15 students while the experimental group had 20 students.

Student Attitude towards Mathematics (SATM). The SATM was an attitude questionnaire with 20 items. It has a 4-point Likert type rating scale weighted as strongly agreed = 4, agreed weighted as 3, disagreed weighted as 2 and strongly disagreed weighted as 1. Based on the result of trial testing the coefficient of reliability was calculated using Cronbach Alpha. There liability index r = .81. what was the validity index and which process did you use to determine it?

Two appointed research assistants were separately guided by the researchers to conduct a pretest by administering the questionnaire. Thereafter, they used the lesson notes prepared by the researchers on Geometry to administer the treatment (teaching) for six weeks. Thereafter, the post-test was conducted by administering the questionnaire again. The descriptive statistics was used to analyse the research questions and analysis of covariance (ANCOVA) was used to analyse the hypotheses at 0.05 level of significance.

FINDINGS

Research question 1: What are the mean differences in attitude of students who were taught Mathematics with smart board and those who were taught Mathematics with chalkboard?

Table 1: Mean and Standard Deviation of Pretest and Post-Test Attitude of Students Taught Mathematics using Smart Board and Chalkboard.

Group	Type of test	N	Mean	Standard Deviation	Mean Gain
Control	Pretest	15	47.33	7.825	
	Post test	15	47.80	7.380	0.47
Experiment	Pretest	20	48.90	12.061	
	Post test	20	57.40	9.040	8.50

Table 1 is the result of change in attitudinal disposition of the students toward Mathematics due to the treatments. For the control group, the pretest mean score for attitude is 47.33 with standard deviation =7.825, while the post test is 47.80 with standard deviation =7.380 for the control group. It implies that gain in mean for the control group is 0.47. For the experimental group, the pretest mean attitude score is 48.90 with standard deviation 12.061 while the post-test and standard deviation is 57.40 and 9.040 respectively. The mean gain for the experimental group is 8.50. This implies that the experimental group has impacted highly on student's attitude towards Mathematics.

Research question 2: What are the mean differences in the attitude of male and female students who were taught with smart board and those who were taught with chalkboard?

Table 2: Mean Difference of Attitude of Students Who were Taught with Smart Board and Those Who Were Taught with Chalkboard.

Group	Sex	Mean Pretest	Standard Deviation	Mean Post test	Standard Deviation	Mean Gain
Control	M	46.13	5.768	46.63	5.153	0.50
	F	48.71	9.995	49.14	9.599	0.43
Experiment	M	49.19	10.591	59.63	10.460	10.44
	F	46.67	10.932	55.92	8.096	9.25

Table 2 above shows the result of mean difference in male and female change in attitude due to treatments. Under the control group, the mean and standard deviation for male student is 46.13 and 5.768 while their post-test mean and standard deviation are 46.63 and 5.153 respectively. The gain in mean is .50. The female pretest and standard deviations are 48.71 and 9.995 respectively while their post-test mean and standard deviation are 49.14 and 9.599. Gain in mean for the female under the control group is 0.43. Both the main gains of male and female are low for the control group.

Under the experimental group, the pretest mean attitude and its standard deviation are 49.19 and 10.591 while their post-test mean standard deviations are 59.63 and 10.460 respectively. The mean gain for male under the "experimental group" is 10.44. For female under "experimental group", the pretest mean and standard deviation are 46.67 and 10.932 while their post-test mean and standard deviation are 55.92 and 8.096 respectively. The female has a gain in mean of 9.25. It also shows here that the teaching with smart board has greater effect on male than female students.

H_{O1}: There is no significant main effect of treatment on students' attitude towards Mathematics.

Table 3: ANCOVA showing the Result of Effect of Treatment on Students' Attitude Towards Mathematics

Sources	Type III sum Of squares	Df	Mean Square	F	Sig	Partial Eta squared
Corrected model	2877.542[a]	4	719.386	94.822	.000	.927
Intercept	357.892	1	357.892	47.174	.000	.611
Attitude	1997.923	1	1997.923	263.346	.000	.898
Treatment	577.671	1	577.671	76.143	.000	.717
Sex	2.478	1	2.478	.327	.572	.011
Treatment * sex	2.781E-005	1	2.781E-005	.000	.998	.000
Error	227.601	30	7.587			
Total	102483.000	35				
Corrected total	3105.143	34				

a. R squared = .927 (Adjusted R squared =.917)

Table 3 is the result of treatment on students' attitude towards Mathematics. This was used in reporting results for hypotheses 1, 2 and 3.

H01 states that there is no significant main effect of treatment on students' attitude towards Mathematics.

Table 3 shows that F(1,35) = 76.143; with P= .000 < .05. It implies that the test statistic is significant. We reject the null hypothesis which states that there is no significant main effect of treatment on students' attitude towards Mathematics. We conclude that there is significant main effect of treatment on students' attitude towards Mathematics. The partial eta squared is .717. This implies that the experimental treatment has imparted 71.7% to the variation of students' attitude towards Mathematics. This also complements the result of large gain in mean we have already considered in research question 1.

$H0_2$: There is no significant effect of gender on students' attitude towards Mathematics.
The result of hypothesis 2 is also seen in table 3. F(1,35) =.372; the p=.572. Since the p value is greater than .05, we uphold the null hypothesis which says that there is no significant effect of gender on students' attitude towards Mathematics. We conclude that there is no significant effect of gender on students' attitude towards Mathematics.

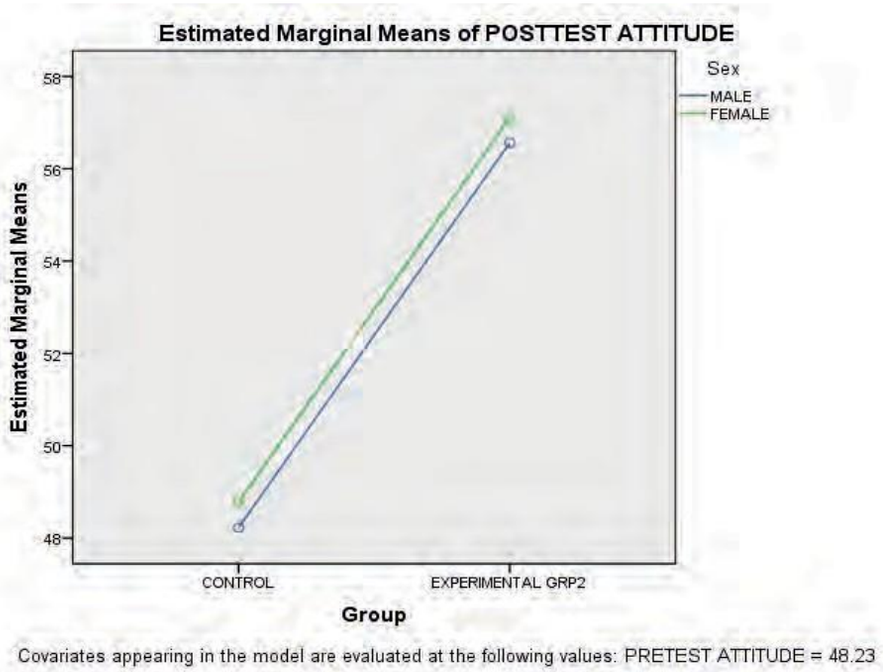

Figure 1: Estimated Marginal Means of Posttest Attitude

The figure 1 above is that of the estimated marginal means of posttest attitude. It is a comparison of attitudinal change of male and female students after the treatments and with reference to the pretests.

H0$_3$ states that there is no significant interaction effect of treatment and gender on students' attitude towards Mathematics.

The report for H03 is that F(1,35) = .000; and P= .998 > .05. Since P is greater than .05, it implies that the null hypothesis H03 is not rejected. It is concluded that there is no significant interaction effect of treatment and gender on students' attitude towards Mathematics. The partial eta squared of .000 is an indication that the interaction effect of the two factors is zero, which is negligible.

From the research work, students in the experimental group had a more favorable attitude towards Mathematics' before and after the exposure. The reason for this is that, in the experimental group, students were taught using the Interactive White Board. This implies that instructional presentation with the smart board was more positive and effective in promoting students' positive attitude in the teaching of Mathematics than the chalk board presentation. This finding corroborates those of previous researchers such as Kent (2004), Batdt (2017). They observed that when classes were taught using smart board instead of the chalkboard in instructional presentation, students were more engaged, attentive, and inspired. This is also in agreement with the reports of Muhanna and Nejem (2013), and Akar and Karakas (2020).

Furthermore, the finding of the study is in support of Afolabi (2010, 2016), which submits that inappropriate teaching technique is one of the factors that contribute to poor achievement in Mathematics. It is so because the teaching techniques that involves active participation of the students also motivate them to learn. Thus, resulting in improved attitude towards a subject and better achievement in it.

This development may be due to the following factors: Mathematics teachers can use the smart board to do a variety of things to make studying Mathematics more fun, because of the flexibility of smart board to create slideshows, use the internet, draw images, and play mathematical games. Kennewell & Beauchamp (2007) observed that using technology has helped students imagine Mathematics, participate in active learning activities, verify conjectures, maintain positive attitudes, and gain trust in their capability to do Mathematics. The improved attitude of the students could be explained to be that students are more relaxed while learning Mathematics with a smart board because it is easier to use it for pictorial illustrations. They listen, hear and are involved during a lesson with a smart board presentation which makes Mathematics lessons more enjoyable and motivational for students (Bozkus and Karacabey, 2019). Also, using a smart board to visualise mathematical reality enhances understanding and ability to recall what was learnt. It also encourages students' active participation in the lesson.

The fact that there is no significant effect of gender on treatment is an indication that the mean differences that exist among the male and female is not statistically significant, although it was in favour of the male students. The implication of the findings is that male and female would have similar disposition towards learning when smart technology is used as a medium of instructional presentation. If smart technology is used, the recurrent research reports that favours one sex performing than the other will be minimized.

CONCLUSION

The experimental and control groups scored significantly differently on attitude towards Mathematics in this study. There is need for more research on the use of smart board in presenting Mathematics instruction. The study has proven that smart board improves attitude towards learning of Mathematics. Due to positive correlation between attitude and achievement, there is tendency for improved achievement in Mathematics This explained the reason for the positive change in attitude of the students. The smart board has the capability to challenge minds of the learner. Use of smart board technology has the potential to make male and female students to learn without bias.

Recommendations

Many researches make comparison on efficacy of teaching methods that can yield variance in Mathematics achievement, this study that improves interest and gives students a re-orientation with positive attitude is a more important dimension to achieve the goal of good performance. Therefore

i. smart board should be used. This is because the technology works on the senses of the learner.
ii. for a maximum benefit from smart board technology, the teachers should be trained on how to use the tool for classroom instruction.
iii. further areas of research on the use of smart board could be on problem-solving skill, mathematical reasoning. Studies can be carried out on impacts of smart board on learning outcomes and on its effect at various grade levels or classes.

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