EFFECTS OF INTERACTIVE WHITEBOARD ON SECONDARY SCHOOL STUDENTS' ACHIEVEMENT AND INTEREST IN ENGLISH GRAMMAR

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Abstract
There is need for reform in the education sector in Nigeria and some innovative resources like the interactive whiteboard might aid such reform. Therefore, the study investigated the effects interactive whiteboard on secondary school students' achievement and interest in English grammar. Two research questions and two hypotheses guided the study which adopted pretest posttest non-equivalent group quasi-experimental research design. The study used the purposive sampling technique to sample 63 SS II students in two intact classes. Data were collected using Students' Achievement in English Grammar Test (SAEGT) and Students' Interest Inventory designed by the researchers. Mean was used to answer the research questions while Analysis of Covariance (ANCOVA) was used to test the hypotheses at .05 level of significance. Results showed that interactive whiteboard had a significantly positive effect on students' achievement and interest in English grammar. It was thus recommended that interactive whiteboards should be integrated in teaching secondary school student's English language and other subjects.

Keywords: Interactive Whiteboard, Traditional whiteboard, Achievement, Interest, English Grammar.

Introduction

Information and Communication Technology (ICT) has changed the way many tasks are handled. ICT has a wide range of applications in almost every field of life. The educational sector is not left out as it is experiencing a surge in the use of ICT in teaching and learning as well assessment. The surge could be because the traditional blackboards as teaching media are no longer suitable for these computer-age children (Yang, Wang & Kao, 2012). Some of the most notable ICTs used in the educational system are simulations and games, e-books, virtual environment, and multimedia utilization which has made lesson presentation more interactive and engaging (Ajelabi, 2015). However, newer technologies are constantly permeating the educational sector too. One of the most recent technology that could be used in the educational sector is the interactive white board (IWB). An interactive whiteboard is a set of technological equipment comprising of a motor user interaction system, a projector, the computer, interactive whiteboard software organized so as to fulfill a specific task (Esteves & Fiscarelli, 2015), a tool consisting of a large flat screen or whiteboard linked to a computer in which the screen mirrors the computer with which it is connected (Mil, Mail & Mail, 2017). To do this, the IWB uses softwares such as electronic microscopes, multimedia materials, videos, data tables, CD ROM, or the Internet (Miller, Glower &Averis, 2005).

Each component of the interactive white board has a unique function but all work in unison to deliver a task such a teaching and learning content or a specific topic in a subject area. The projector is used to display images and the content of the computer screen on the board, the learner or teachers can control and manipulate the content using the electronic pen or stylus (Esteves & Fiscarelli, 2015). In recently developed interactive whiteboards, finger touching the area of the board can be used to control the computer rather than the stylus.

The IWB serves as useful aids in classrooms that add interactivity and collaboration, and designed to engage students and assist teachers to deliver lessons through creating a wide range of learning opportunities (Sadeq, Akbar, Taqi & Rajab, 2016). Students can use its touch screen smart board to experiment, solve, write and erase applications as visual experiments, visuals, animations and graphics (Akbaş & Pektaş, 2011). It can also be used for brainstorming, frontal teaching, discussion sessions, planning and editing of writing, or even to teach grammar or vocabulary practice for the whole class. Its main advantage over the traditional teaching method of writing on the boards is that it can be used to perform multitasks. It also allow for design and use course materials in various file format, control application running on the computer by teachers or students, manipulate and interact with the course content on the computer from the board and also allows the performance of different functions such as highlighting, annotating, drag-and-drop activities, screen shade, zooming, screen sharing over the Internet, and connection to web-based applications (Kurtz et al, 2013). Also, IWB enables multimedia presentation and/or outcome of a class discussion on the board which can be saved in a digital file and uploaded to a course website or sent to the students for further study (Kurtz & Chen, 2012). Some other advantages ofIWB include: increase in students' engagement, effective visual representation, and greater classroom interaction (İşman et al., 2012; Winzenried et al., 2010). The technology help teachers to accommodate different style of learning and allows learning material to be presented on the board and can be used for brainstorming, frontal teaching, discussion sessions, planning and editing of writing, or even grammar or vocabulary practice for the whole class.

IWBs offers innovative and powerful support for language acquisition in foreign language classrooms such as English language (Muhammad et al, 2018). Grammar is one areas of the English language which determines users' competences and performance in the language (2015). Grammar refers to a set of patterns in which the words of a language are arranged in order to convey meanings, the proper arrangement of words in sentences and patterns and forms of a language used and accepted by the native speakers of that language (Egbe, 2015).Grammar content covers nouns, pronouns, noun phrases, nominalization, tense, aspect, sequence of tenses, phrasal verbs, and concord, transitive and intransitive verbs. It also includes adjectives and adverbs, as well as phrases and clauses. As such, grammar form a bulk of the areas covered in English language examinations and reflects in students' writing skills in writing compositions and summary writing. As such, students' competences in grammar could affect their achievement in English language as a whole.

Despite its usefulness in aiding students' achievement in English language, reports from the West African Examination Council WAEC (2015-2019) revealed that secondary school students face problems in the area of grammar in their final English language examinations which affects their overall achievement in English language which. Accordingly, WAEC (2018) noted that students' achievement in English language has been poor over these years with only 49.98% of students who sat for the examination in 2018 obtained five credits and above including English language. Supporting this position, Attah and Ita (2017) reported that there have been a decline in the achievement of students in English language over the years.

Academic achievement are measures of how well students are accomplishing a given tasks and studies (Scortt, 2012) it could also be defined as skills and knowledge acquired by students which could be measured using standardized tests (Ballafkih &Van) Middelkoop, 2019). Students' interest may be correlated their achievement (Torty, 2010). Interest is a strong knowledge emotion, an overwhelming magnetic positive feeling, a sense of being captivated, enthralled, invigorated and energized to process information (Kpolovi et al, 2014). It could also be seen as an effective application of self-regulatory skills, self-discipline, working harder and smarter with optimum persistence. Interest may substantially influence educational

achievement and other aspects of an individual's life (Kpolovie et al 2014), because if a student is interested in any subject, the student will spend more time studying that subject which could lead to greater achievement (Egbe, 2015).

Previous studies revealed that IWB has potential for greater interactivity between teachers and students, and increased students' engagement, motivation, and enjoyment (Hennessy, 2011, Sad & Özhan, 2012) which could positively impact on their achievement and interest. Teachers can use the IWB to enrich their instructions using different instructional methods which could increase students' attention, motivation, participation, and collaboration (Türel & Johnson, 2012). Other studies such as (Tunaboylu & Demir, 2017) revealed that interactive whiteboard in mathematics teaching process has positive effects on the students' mathematical achievement, and could help improve students use adverbs more accurately (Amiria & Sharifib (2014). Also, using smart board to teach sounds of letter was effective in teaching letter sounds to students (Campbell & Mechling, 2009). The implication of the above findings is that interactive whiteboard could be a useful device to teach English grammar. On the contrary, another study (Akbaş & Pektaş, 2011)on the effect of IWB and laboratory practices on academic achievement of university students revealed that no significant difference was observed between the academic achievement of the students using interactive whiteboard and laboratory practices, and the control group but that IWB encouraged students to participate more in the lesson, created an interesting and enthusiastic atmosphere, and led to more enjoyable lessons. Hence, the use of IWB could boast students' interest in learning. However, the above controversies in research reports indicate that more research is needed on the effect of IWB on students' learning outcomes.

Despite the potency of the use of IWB on teaching and learning, it presence cannot be seen in most Nigerian classrooms especially at the secondary school level. This could be explained partly by the fact most developing countries including Nigeria invest less in education of her citizens or that most of these countries struggle with scarce resources and may not prioritize education. It could also be that their teachers may not have been properly trained to integrate technology in teaching. However, research is needed to inform the implementation of policies and programmes aimed at promoting the use of technology in the classroom. But, there is a mere lack of research on the effect of most technologies including the interactive white board on students' learning outcomes in Nigeria. This underscores the need for the present study which sought to investigate the effect of the interactive white board on secondary school students' achievement and interest in English grammar.

Research Questions

The following research questions were posed to guide the study.

1. What are the mean achievement scores in English grammar of students taught using interactive whiteboard and those taught with the traditional whiteboard?
2. What are the mean interest rating scores in English grammar of students taught using interactive whiteboard and those taught with the traditional whiteboard?

Hypotheses

The following null hypotheses were formulated for the study and were tested at 0.05 level of significance.

Ho_1: There is no significant difference in the mean achievement scores in English grammar of students taught using interactive whiteboard and those taught with the traditional whiteboard

Ho_2: There is no significant difference in the mean interest rating scores in English grammar of students taught using interactive whiteboard and those taught with the traditional whiteboard.

Methods

The study adopted a non-equivalent group, pretest and posttest quasi-experimental research design. The study was conducted in Cross River State, Nigeria. The population of the study consisted of 22, 143 SSII students in 563 private secondary schools in Cross Rivers State, Nigeria. The sample of the study was 63 (37 male and 26 female) students in two intact classes. The sample was drawn using purposive sampling technique. Two schools with interactive whiteboards facilities and with qualified and experience English language teachers were sampled. The two intact classes were assigned to the experimental and control group using simple random sampling technique. The experimental group had 29 (15 male and 14 female) students while the control group had 34 (22 male and 12 female) students.

Two instruments constructed by the researchers were used to collect data. The instruments were: Students' Interest Inventory (SII) and Students' Achievement in English Grammar Tests (SAEGT). The SII consisted of section A and B. Section A elicited personal information of the students including student's gender, class identification number, school code. Section B contained 20 items that elicited data on the students' interest in English Grammar. The ratings for each of the items ranged from 1-4 depicting strongly agree, agree, disagree and strongly disagree. The SAEGT contained 50 dichotomously scored multiple choice items with four response options of A, B, C and D that elicited information on students' achievement in English grammar. The test has four sections, and they are based on the Table of Specification prepared for the purpose. The Table of Specification has both the content dimension and the ability process dimension. The content dimension is made up of four units drawn from the Senior Secondary Education Curriculum on English Language for SSS II. The ability process dimension is subdivided into knowledge and comprehension (lower order) and application (higher order) levels of Bloom's taxonomy of educational objectives. The first two content areas were assigned 15 questions each, while the last two content areas were assigned 10 questions each to make a total of 50 questions for the test. The questions were distributed such that section A has 10questions and it deals with the identification of singular or plural subjects that agree in number with the underlined singular or plural verbs. Section B has 10 questions to tests students' ability to correct a grammatically wrong sentence by choosing the correct number. Section C has 20 questions and it tests students' ability to apply their knowledge of grammar in choosing the verb that is most appropriate in number and tense to complete each of the sentences. Section D has 10 numbers which expected students to read the passage and fill in the gaps in the passage with the most appropriate form of the verb from the options given.

The SAEGT together with lesson plans were face-validated by three experts; two from English Language Education, Department of Arts Education and one from Measurement and Evaluation unit, Department of Science Education, all from the University of Nigeria, Nsukka. The SII and SAEGT were later trial-tested on 20 SS II students in a private school that was not involved in the study but met the criteria for the study. The reliability coefficient was established using estimate of internal consistency. Cronbach Alpha technique was applied to obtain the reliability coefficient of the SII while Kuder-Richardson20 method was used to establish reliability coefficient of the SAEGT. The reliability coefficients for both instruments were .84 and .89 for the SII and SAEGT respectively.

Procedure

The researchers visited the schools and sought for informed consent and permission of the authorities of the school to conduct the experiment in their schools. After permission was granted, the researchers through the assistants of the schools' principals recruited two English

language teachers as research assistants. In order to avoid experimental bias, the researchers will not be involved in the teaching process so as to ensure that the students were not aware that they were involved in an experiment. The research assistants were adequately informed and well-orientated about the objectives of the study, method of lesson presentation, and were exposed to the experimental interactive whiteboard and how to administer the instruments for data collection.

The experiment lasted for a duration of seven weeks of four lessons per week. In the first week, coaching of the research assistants was done after which the instruments were pretested on the students in both control and experimental groups. The actual experiment commenced in both control group and experimental group from the second week through the sixth week. The experiment was conducted following the schools' timetables the five weeks of 40 minutes per lesson period daily. The same lesson plans, with the same content, specific objectives, duration and evaluation were developed for the two groups. The experimental group students were taught using the interactive whiteboard while the control group was taught using the traditional whiteboard.

On the seventh week, items in the instruments administered at pretest were reshuffled and re-administered as post test to the students. This was to determine the effect of the different treatments on students' achievement and interest in English grammar. The students' responses on the SAEGT were scored by the teachers. Each correct option in the SAEGT was scored one pointwhereas each wrong option attracted zero point. The researchers entered the pretest and posttest scores for both the interest inventory and the achievement test on SPSS version 22. The data were analyzed using mean and standard deviations to answer the research questions while the null hypotheses were tested using analysis of covariance (ANCOVA) at 0.05 level of significance.

Results

Table1: Mean and Standard deviation of achievement scores of students taught using interactive whiteboard and those taught using the traditional chalkboard

Groups		Pretest		Posttest		Mean Difference
	N	$\bar{x}$	SD	$\bar{x}$	SD	
Experimental (IWB)	29	36.41	5.32	42.72	3.29	6.31
Control (Traditional chalkboard)	34	34.55	5.24	37.38	3.71	2.83

Result in Table 1 shows that students taught using interactive whiteboard had a mean achievement score of ($\bar{x}$ = 36.41, SD = 5.32) at pretest and a score of ($\bar{x}$ = 42.72.30, SD =3.29) at posttest while those taught using the traditional whiteboard had a mean achievement score of ($\bar{x}$ = 34.55, SD = 5.24) at pretest and a score of ($\bar{x}$ = 37.38, SD =3.71) at posttest. Mean difference of 6.31 and 2.83 for the experimental and control groups respectively depicts that interactive whiteboard had positive effect on students' achievement in English grammar.

Table 2: Analysis of Covariance (ANCOVA) of the effect of interactive whiteboard on students' achievement in English grammar

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	683.429[a]	2	341.714	39.354	.000	.567
Intercept	947.578	1	947.578	109.129	.000	.645
Pretest achieve	236.839	1	236.839	27.276	.000	.313
Methods	327.846	1	327.846	37.757	.000	.386
Error	520.984	60	8.683			
Total	101206.000	63				
Corrected Total	1204.413	62				

Note: S = significant, NS = Not Significant, η^2_p = partial eta squared

The result in Table 2 shows that the effect of interactive whiteboard on students' achievement in English grammar was significant ($F(1, 62) = 37.75$, $p < .05$, $\eta^2_p = .386$), thus the hypothesis is rejected . This is because the exact probability value of 0.00 is less than 0.05 set as level of significance. The effect size of ($\eta^2_p = .386$), moreover, indicates that 38.6 percent changes in students' achievement in English grammar is accounted for by the use of interactive whiteboard. Thus, inference drawn is that interactive whiteboard has a significant positive effect on students' achievement in English grammar.

Table 3: Mean and Standard deviation of interest rating scores of students taught using interactive whiteboard and those taught using the traditional chalkboard

Groups		**Pretest**		**Posttest**		
	N	$\bar{x}$	**SD**	$\bar{x}$	**SD**	**Mean Difference**
Experimental (flipped classroom)	19	49.38	7.52	62.28	9.02	12.90
Control (No flipped classroom)	34	46.64	7.82	51.82	8.74	5.18

Result in Table 3 shows that students who were taught using interactive whiteboard had mean interest rating score of ($\bar{x}$ = 49.38, SD = 7.52) at pretest and a mean interest rating score of ($\bar{x}$ = 62.28,SD =9.02) at posttest while those taught using the traditional whiteboard had a mean interest rating score of ($\bar{x}$ = 46.64, SD = 7.82) at pretest and a mean interest rating score of ($\bar{x}$ = 51.82, SD =8.74) at posttest. Mean difference of 12.90 and 5.18 for the experimental and control groups respectively implies that interactive whiteboard had positive effect on students' mean interest rating scores in English grammar.

Table 4: Analysis of Covariance (ANCOVA) of the effect of interactive whiteboard on students' interest in English grammar

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	5038.543[a]	2	2519.272	102.684	.000	.774
Intercept	182.129	1	182.129	7.423	.008	.110
pretestint	3328.674	1	3328.674	135.674	.000	.693
Methods	928.822	1	928.822	37.858	.000	.387
Error	1472.060	60	24.534			
Total	208584.000	63				
Corrected Total	6510.603	62				

Note: S = significant, NS = Not Significant, η^2_p = partial eta squared

Result in Table 4shows that the effect of interactive whiteboard on students' interest in English grammar was significant ($F(1, 62) = 37.86$, $p < .05$, $\eta^2_p = .387$), hence, the null

hypothesis is rejected. This is because the exact probability value of 0.00 is less than 0.05 set as level of significance. Furthermore, the effect size of (η^2_p = .387), indicates that 38.7 percent changes in students' interest rating scores in English grammar is attributable to the use of interactive whiteboard. Hence, inference drawn is that interactive whiteboard has a significantly positive effect on students' interest in English grammar.

Discussions

The purpose of the study was to investigate the effect of interactive whiteboard on secondary school students' achievement and interest in English grammar. The findings of the study show that interactive whiteboard had a significantly positive effect on students' mean achievement and interest scores in English grammar. This means that the use of interactive whiteboard is a more effective and efficient technology that could improve students' achievement and interest in English grammar than the traditional whiteboard. The finding is in line with the previous findings of Tunaboylu & Demir (2017) who revealed that interactive whiteboard in mathematics teaching process has positive effects on the students' mathematical achievement and Amiria and Sharifib (2014) who reported that the use of interactive whiteboard could help improve students use adverbs more accurately. Furthermore, the results of the study also corroborate with previous studies from Hennessy (2011), Sad and Özhan (2012) who reported that the use of interactive whiteboard improves students' engagement, motivation, and enjoyment. This could be so because the use of interactive whiteboards provides the students the opportunity to interact with the whiteboard and making the students more active in the teaching and learning process and makes the teaching and learning students' friendly and more engaging. This could lead to improvement in achievement scores. Also, because the students interact with the whiteboard and are also captivated with the computerized images on it, this could help boost their interest in learning the content being taught. Hence, this would improve their interest in English grammar very well.

Conclusion

Students' achievement and interest in English language has been noted to be poor over the years, which is a major concern to stakeholders in education. The students' inability to be very competent in the use of English grammar is a concern to the educators. The present study therefore provides insight into the effect of interactive whiteboard on secondary school achievement and interest in English grammar. The researchers concluded based on the findings of the study that the use of interactive whiteboard has significant positive effect on secondary school students' achievement in English grammar. Furthermore, the findings it was concluded that the use of interactive whiteboard have a significant positive effect on students' interest in English grammar. Hence, the findings provided data on the efficacy of the use interactive whiteboard as a technological device to aid the teaching and learning of English language in secondary schools.

Recommendations

Based on the findings, the researchers recommended that:

1. Interactive whiteboards should be integrated in teaching secondary school students English language and other subjects.
2. Schools should be provided with interactive whiteboards and adequate technology tools by Government and other stakeholders in education to assist teachers in teaching.

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