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APPLICATION OF EXPERIENTIAL TEACHING METHOD AND STUDENTS` ACADEMIC RETENTION IN RIVERS STATE NIGERIA.

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ABSTRACT

The study investigated the application of experiential teaching method and students` academic retention in Rivers State Nigeria. The research design adopted for the study was quasi-experimental. Intact classes of (118) JSS1 students formed the sample of the study using a simple random sampling technique. Two research questions were answered and two null hypotheses were posited and tested at a 0.05 level of significance. The research instrument used for the study was Mathematics Performance Test (MPT). The reliability of the research instrument was computed using the Kuder-Richardson formula (K – R 21) which yielded a reliability coefficient of 0.84. The instrument was administered and the data obtained were analyzed using Analysis of Covariance (ANCOVA) to test for the hypotheses while mean and standard deviation were used to answer research questions. The findings established that the students who were taught with the experiential teaching method retained higher than the students taught with the deductive teaching method. Empirically it was proven that there was no significant difference on students' retention with respect to the use of experiential teaching methods based on gender, but male students had higher retention than their female counterparts in the same group. Based on the findings, the study among others recommended that Mathematics teachers should use experiential teaching method in teaching Mathematics to eradicate students` problem of poor retention in Mathematics.

Keywords: Experiential teaching method, Academic Retention, and Gender.

Introduction

Mathematics is a skillful subject. Certain qualities nurtured by Mathematics are the power of perception, inventiveness, abstract or spatial, critical thoughtfulness, problem-solving capacity, and active communication skills. According to, Malik, Ayotunde and Sulamimon (2019) Mathematics is a subject

that students must take paramount care of and work towards its understanding for future academic pursuit and general well-being of the individual. No student excels without sound Mathematical background. This is the reason more recognition is given to Mathematics because of its application in all areas of life (Hodgen & Marks, 2013). Yet in spite of the huge importance attached to the study of Mathematics in Nigeria and the effort of the government in making Mathematics an obligatory subject, the performance has been always poor in both external and internal examinations (Umar Sa'ad, Abba & Abdullahi 2014). In this regard, the task before a teacher is how to help learners improve their capacity to integrate information towards active recalling or salvaging when the need arises. It implies that Mathematics teaching demands that mathematics teachers focus consideration on methods of teaching that stimulate zeal, interest, and a higher retention rate in the learners. Also, Sani and Salahudeen (2016) wrote that the ways to improve the retention of secondary school students in Mathematics include the provision and use of mathematical concrete materials, qualified Mathematics teachers, developing a positive attitude of students towards Mathematics, involvement of parents in the education of their children, organization of quizzes and competition among schools, using proper methods of teaching. This suggests that Mathematics teachers should be able to apply appropriate teaching methods which take care of the individual capacities of learners to retain concepts learned in Mathematics (Ado and Abasi 2014 & Thiyagu 2015).

From the on-going, it means that to check the problem of poor retention, teachers should use teaching methods that would augment students' retention in the learning of Mathematics. Students are most enthusiastic about knowing when they are a dynamic part of the procedure especially when hands-on involvement is intricate. Student-led instruction requires students to make more sense of the information which should lead to an upsurge in retention. The sturdier the construction, the more possible students will remember the information since the brain can only store information that has a sturdier, deeper connotation to the person. The more enthusiastically involved learners are in the learning process, the more likely the information will be retained; hopefully for longer periods of time (Bouman, 2012)

When students' performance is high, there is also the need to assess the retention of the knowledge they acquired in Mathematics. Retention of mathematical knowledge and skill means acquiring the knowledge and skills which will be used later. Retention of mathematical knowledge is very important because it aids the students to continue to process the learned knowledge which will be used later by transfer. Retention takes place when information is stored in long-term memory for retrieval. According to, Malik, Muhammad and Qayyum (2015) when students learn Mathematics and perform highly during the assessment but are unable to retrieve that which they have learned after a period of time, it is evident that they did not retain the

knowledge learned. It follows that retention is intertwined with memory.

Statement of the Problem

The researchers have detected with shock, that students' performance in Mathematics examinations (internal and external) has unceasingly been meager at the junior secondary school level. It is evident that this poor performance has surged in the senior secondary school as can be seen in table 1 below which present the West African Examination Council (WAEC) Chief Examiner`s reports for 2013-2018.

Table 1Percentage of students with credit pass and above in WASSCE (2013 -2018)

YEAR	TOTAL NUMBER OF STUDENTS WHO SAT FOR WASSCE	NUMBER OF STUDENTS THAT OBTAINED CREDIT AND ABOVE A1 – C6	PERCENTAGE OF STUDENTS WITH CREDIT AND ABOVE A1 – C6
2013	1,543,683	555,726	36.00
2014	1,692,435	529,738	31.30
2015	1,593,442	544,638	34.18
2016	1,544,234	597,310	38.68
2017	1,559,162	923,424	39.22
2018	1,471,151	786,016	37..98

Source-: Chief Examiner`s Report West African Examination Council (WAEC).

This poor performance can be attributed to lack of retention of mathematical contents learned, this trigged this study. Therefore, the gap of this study is how to provide empirical evidence on the efficacy of the use of experiential teaching method in solving the problem of poor students` retention in Mathematics.

Aim and Objectives of the Study:

The study explored the application of experiential teaching method and students` retention in Rivers State Nigeria.
Specifically, the study:

1. Ascertained if there is any difference in the mean retention scores of junior secondary school students taught with experiential teaching method and those taught using deductive teaching method.
2. Found out whether there is any difference in the mean retention scores of male and female students taught with experiential teaching method.

Research Questions

The following research questions guided this study.

1. What is the difference in the mean retention scores of students taught with experiential teaching method and those taught using deductive teaching method?
2. What is the difference in the mean retention scores of the male and the female students taught geometry with experiential teaching method?

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Hypotheses:

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

1. There is no significant difference in the mean retention scores of students taught with experiential teaching method and those taught using deductive teaching method.
2. There is no significant difference in the mean retention scores of the male and the female students taught geometry with experiential teaching method.

Research Methods

Research design

The study adopted quasi-experimental research, structured as pretest-posttest non-randomized design. The pretest-posttest control group design was used to how the application of experiential teaching method will affect students` academic retention in Oyigbo Local Government Area of Rivers State

Area of the study: The study was carried out in Oyigbo Local Government Area in Rivers State.

Population of the study: The population of this study consisted of all the Junior Secondary School one students in the seven mixed government junior secondary schools in Oyigbo Local Government Area of Rivers State. As at the time of the study (2018/2019 academic session) there were three thousand four hundred and fifty-one (3451) students made up of one thousand seven hundred and seventy-seven females (1777) and one thousand six hundred and seventy-four males (1,674), (Source, Zonal Post-primary School Board, Oyigbo Education Zone).

Sample and sampling technique: Intact classes comprising of a total of 118 JSS1 students formed the sample of the study. A simple random sampling technique was used to select two junior secondary schools one in Oyigbo Local Government Area of Rivers State, in which one school was used as the experimental group and the other school as the control group. A simple random sampling technique was also used to select one arm of JSS1 classes in each school, experimental group consisted of (66) students made up of (32) females and (34) males. The control group was made of fifty-two (52) students made up of thirty-one (31) females and twenty-one (21) males.

Instrument for data collection: The researchers developed an instrument titled "Mathematics Performance Test (MPT) which was used to collect data. MPT was made up of twenty-five multiple choice test items with options A to D. The instrument was used for pre-test, post-test, and post-posttest. The items of the instrument were re-shuffled before the administration of the posttest and post-posttest to reduce the memory effect. The students were required to answer all the questions. The content of the test items was derived from the topics that were taught. The instrument contained 2 sections. Section A elicited information on the students' personal data. Section B contained 25 multiple-choice test items which measured students' academic retention.

Validation of the instrument: To establish whether the test items in (MPT) addressed the topic of the research, the instrument was presented to one research expert in the

department of Curriculum Studies and Educational Technology, one research expert in measurement and evaluation at the University of Port Harcourt and one experienced mathematics teacher to vet the content and errors in grammar, spellings, disregard vagueness and establish appropriate coverage of the instrument. The inputs were corrected at the final construction of the instrument.

Reliability of the instrument: The reliability of MPT was established by carrying out a trial testing on a sample of 20 students who were not part of the sample for this study. The students were administered MPT once without any form of teaching with regard to the study. The answer scripts were retrieved, marked, and graded in percentage. Reliability was computed using the Kuder Richardson formula (K – R 21) which yielded a reliability coefficient of 0.84. This reliability index showed that MPT was reliable for the conduct of the investigation.

Method of data collection: The instrument was used to generate data at three different times during the study, namely pretest, posttest, and post-posttest. Participants of the experimental groups and the control group were given a pretest before treatment, after treatment, posttest, and post-posttest two weeks after the posttest respectively. The results of the test formed part of the data of this study.

Experimental procedure: The researchers employed the intact classes' Mathematics teachers as assistant researchers to deliver the lessons. These teachers were trained for two days by the researcher on the mood of instruction. The students in the two different groups were first given a pretest of (MPT) without any form of prior teaching. After the pretest, the research assistants taught their respective groups the assigned lesson plans. The students in the experimental groups were taught with the experiential teaching method, while the control group was taught with the deductive method. A posttest of (MPT) was given to the two groups after the teaching which lasted for a period of four consecutive weeks after two weeks of posttest, the post-posttest was administered. The post-test was administered to the same students but this time, the test items were reshuffled starting with an even number of items from the bottom likewise the post-posttest. The scripts for the pretest, posttest and post-posttest were collated, marked, and graded in percentage.

Method of data analysis: The research questions were answered using mean and standard deviation, while Analysis of Covariance (ANCOVA) was used for the testing of the hypotheses. This was used to take care of the initial differences in the groups and to control selection bias. $P \leq 0.05$ level of significance was set for rejecting or accepting the null hypotheses

Presentation of Results

Research Question 1: What is the difference in the mean retention scores of Mathematics students taught with experiential teaching method and those taught using deductive teaching method?

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Table 2: Descriptive statistics on mean retention scores of students based on the use of experiential teaching method and Deductive method.

Methods		Post_test	Retention_test	Mean difference	Mean difference %
EM	Mean	69.30	72.30	3.00	4.15
	N	66	66		
	SD	11.81	11.43		
DM	Mean	33.15	29.29	-3.87	-13.20
	N	52	52		
	SD	9.28	11.86		

Table 2, shows that students taught with the experiential teaching method had a mean difference of 3.00, while those taught using the deductive method had a mean difference of -3.87 when the posttest and retention test were compared. The percentage mean difference also indicated 4.15 for the students taught with the experiential teaching method while students taught with the deductive method had a percentage mean difference of (-13.20). This indicated a difference in favor of the experimental group.

Research Question 2: What is the difference in the retention mean score of the male and the female students taught geometry with experiential teaching method?

Table 3: Mean and standard deviation on how the retention mean score of students taught with experiential teaching method differ by gender

			Posttest		Post Posttest		Retention	
Group	**Gender**	**N**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
EM	Male	34	68.94	12.14	74.35	10.97	5.41	11.31
	Female	32	69.69	11.62	70.13	11.67	0.44	8.19

Table 3 shows that the male students taught with the experiential teaching method had a retention mean score of 5.41, SD=11.31 while the female students taught with the experiential teaching method had a retention mean score of 0.44, SD=8.19. It is evident from table 3 that the male students who taught geometry with the experiential teaching method had higher retention than their female counterparts in the same group.

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Hypothesis HO_1: There is no significant difference in the mean retention scores of students taught with experiential teaching method and those taught using deductive teaching method.

Table 4: Summary of ANCOVA of retention of students base on the use of experiential teaching method and Deductive method.

Tests of Between-Subjects Effects

Dependent Variable: Retention test

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Decision
Corrected Model	58778.35[a]	2	29389.17	315.74	.00	P < 0.05
Intercept	1901.58	1	1901.58	20.43	.00	P < 0.05
Posttest	4964.20	1	4964.20	53.33	.00	P < 0.05
Methods	**3371.67**	**1**	**3371.67**	**36.22**	**.00**	**P < 0.05**
Error	10704.41	12	93.08			
Total	405305.00	118				
Corrected Total	69482.75	117				

*Significant at P< 0.05

Table 4, shows that using post-test scores as a covariate, $F_{1,115} = 36.22$ at (115) degree of freedom and a probability level of 0.05 with p = 0. 00 which is P < 0.05. The null hypothesis is rejected and the alternative hypothesis is retained. This indicated a significant difference in favor of the experimental group.

$H0_2$: There is no significant difference in the retention mean score of the male and the female students taught geometry with experiential teaching method.

Table 5: Summary of ANCOVA on the difference between the retention mean score of the male and female students taught mathematics with the experiential teaching method

Dependent Variable: Post Post Test					
Source	**Type III Sum of Squares**	**Df**	**Mean Square**	**F**	**p-value**
Corrected Model	3605.36[b]	2	1802.68	23.25	.00
Intercept	1683.39	1	1683.39	21.71	.00
PostTest	3310.68	1	3310.68	42.70	.00
Gender	**360.59**	**1**	**360.59**	**4.65**	**.04**
Error	4884.58	63	77.53		
Total	353520.00	66			
Corrected Total	8489.94	65			

*Significant at P< 0.05

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The result in Table 5 showed that a significant difference exists between the retention mean score of students taught geometry with experiential teaching method based on gender (F1, 63=4.65, p = 0.04 <.05). The null hypothesis six, H_{O6} was rejected at 0.05 level of significance since p-value is less than 0.05.

Discussion of Findings

The analysis of the results of the students' retention tested in Table 2 and Table 4 showed that the students taught with the experiential teaching method had higher mean retention scores in the post-post-test than the students taught with the deductive teaching method. This significant difference is attributed to the treatment in the experimental group. This revealed that the application of the experiential teaching method has positively influenced students` retention ability in geometry. This finding supports the research work of Ehiwario, Aghamie and Azagbaekwue (2018) and Umar, Tudunkaya & Muawiya, (2019). And is consistence with the research work of Bada & Akinbobola (2020) which revealed that students who were taught physics using experiential teaching strategy had higher retention than students in the control group. Likewise the result of the study Bash, Kurumeh, and Samba (2020) concluded that the experiential learning strategy is useful to improve retention ability of students.

The result in table 3 showed that the male students taught with the experiential teaching method had a retention mean score of 5.41, SD=11.31 while the female students taught had a retention mean score of 0.44, SD=8.19. It is evident from table 3 that the male students taught with the experiential teaching method had higher retention than their female counterparts in the same group. When subjected to the statistical test, the result in table 5 showed that a significant difference exists between the retention mean score of students taught with experiential teaching method when analyzed based on gender (F1, 63=4.651, p<.05). This led to the rejection of H_{O5} at a probability level of 0.05 since the p-value is less than 0.05. This finding is in line with the result of Kwesi (2015) and who conducted research on the effect of gender differential on students' retention in geometry and found that the male students had higher retention than the female students in the experimental group with a statistically significant difference with respect to gender. The study however, is in agreement with the work of Owdunni and Ogundola (2013) who found that male students scored higher than female in ability to retain science concepts than girls using inquiry method of teaching. Also, the research outcome of Ishola (2014) was in consistence with the findings present study on the effects of geoboard on students' achievement and retention in Mathematics found that the male students in the experimental group who were taught with geoboard had higher retention than their female counterparts in the same group though there was no significant difference between the two groups with respect to retention. But, the result of Okoli and Abonyi (2013), was not in agreement with the present study, their

result revealed that experiential learning does not discriminate across gender in student's achievement in biology. At same time, Bash, Kurumeh, and Samba (2020) contradicts with finding of the present study, their result on gender in the post-post result showed was that there was no significant effect in the retentive ability of male and female students taught Basic Science using graphic organizer and experiential learning strategies, likewise, the findings of Godpower-Echie and Owo (2019) who found no significant difference in the retention of male and female taught Basic Science using inquiry-based method of teaching.

Conclusion

Based on the findings of this study, it was concluded that the use of the experiential teaching method enhanced students` retention in mathematics more than the deductive method.

It was also, empirically proven that male students taught with experiential teaching methods had higher retention than their female counterparts in the same group.

Recommendations

Based on the findings and conclusions from the study, the following recommendations were made by the researcher:

1. Mathematics teachers should use experiential teaching methods in teaching Mathematics since it improves retention.
2. Mathematics teachers should also give attention to and encourage both gender during classroom interactive sessions such that both male and female students can retain learned concepts better in the study of Mathematics.
3. Mathematics curriculum designers should prescribe the use of experiential teaching methods in teaching and learning Mathematics.
4. Seminars, workshops, and symposia should be organized by the Ministries of Education and professional bodies such as the Mathematical Association of Nigeria (MAN), Science Teachers Association (STAN), Curriculum Organization of Nigeria (CON), and National Mathematical Centre (NMC) on how to integrate experiential teaching method in the teaching of Mathematics.

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