EXPLORATION OF LEARNING TECHNIQUES ON IMPROVING THE ACADEMIC PERFORMANCE OF JUNIOR SECONDARY SCHOOL STUDENTS.

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Abstract
This study explored three major learning techniques (rereading, distributed practice and self-explanation techniques) and its influence on improving the academic performance of Junior Secondary school students. The study was guided by four (4) research hypothesis. The design adopted for this study was experimental design. Purposive sampling technique was used to selected Demonstration Secondary school because of the school's population; ninety-six (96) JSS two students across three (3) arms were selected for the study. Each arm was first taught how to use a learning technique each. The students were pre-tested before being taught a topic on 'the solar system' and a post-test was conducted after two (2) weeks and graded equally by the researcher. The data collected was successfully analysed using T-test and one-way ANCOVA. The result indicated that the use of learning techniques does not have any negative impact on students' academic performance rather, if well used can contribute to enhance students' performance on both immediate and delayed test. The results indicated that students from the rereading technique group performed significantly higher than those in the self-explanation group. A number of recommendations were made towards the enlightenment of students, teachers, parents, and government on the impact of learning techniques on students' academic performance.

Keywords: *Learning technique, academic performance, distributed practice, rereading, self-explanation*

Introduction

The issue of poor academic performance of students has been a concern to the government, parents, teachers and even students in modern day Nigeria. Researchers are still on the quest towards providing a lasting solution to the problem of poor academic performance of students. However, cognitive scientists have shown through recent research studies that the academic performance of students can be improved by students employing some techniques when studying. Ruiz-Martin, Blanco & Ferrero (2024). These techniques are referred to as 'learning techniques.'

Learning techniques are special actions, steps, or processes which a learner can take to make his or her learning easier, faster, more effective and more transferrable to new situations. This

indicates that the purpose of employing learning techniques is to accelerate learning and make recall and transfer of a learned stimulus easier and faster.

Rote-learning memorization has been the dominant learning technique used by students in Basic education in Nigeria. This emphasis on rote memorization is responsible to a great degree of students being passive receivers of information in the classroom.

With the importance of learning techniques in improving learning and recall for students, the classroom is the perfect place in which these effective techniques can be taught. Arming students with these learning techniques is equivalent to giving tools to 'farm". Without giving students effective tools, effective learning cannot take place.

There are several learning techniques which students can be equipped with to help improve their academic performance include summarizing, rereading, self-explanation, keyword mnemonic, visualizing, highlighting, elaborative interrogation, interleaved practice, spaced or distributed practice, concept mapping, practice testing or retrieval practice etc but this research is focused on rereading, distributed practice and self-explanation technique.

Statement of Problem

Adeyemi (2011) conducted a comparative study of students' academic performance in public exams in Secondary schools in Ondo and Ekiti states, Nigeria. It was revealed that the performance of students in Junior Secondary and Senior Secondary Certificate Examinations (SSCE) was low. He recommended that the educational system be revamped and teaching and learning process in all schools in the two states be reexamined with the aim of improving the quality of performance of students in Junior and Senior Secondary School Certificate Examinations.

-Therefore, the problem under study has to do with the examination of the impact of three major learning techniques in improving the academic performance of Junior Secondary School Students in Ondo West Local Government Area.

Research Questions

1. What learning techniques are most effective in learning the academic content?
2. To what extent do these learning techniques improve students' academic performance?

Research Hypothesis

Based on the research questions above, the following research hypothesis were made:

Ho_1 There is no significant difference between students who used distributed practice technique and students who used the rereading learning technique.

Ho_2 There is no significant difference between students who used distributed practice technique and those who used the self-explanation technique.

Ho3 There is no significant difference between students who used the self-explanation technique and those who used the rereading technique.

Ho_4 There is no significant interactive effect of the three learning techniques on the academic achievement of students.

LITERATURE REVIEW

Rereading Technique

Dunlosky, Rawson, Marsh, Nathan & Willingham (2013) describes rereading technique as the restudying of a text material again after an initial reading. It generally involves simple repeatedly reading a text in order to remember the information contained. It is rated by Dunlosky et al (2013) as a low utility learning technique because in direct comparisons to other learning techniques, rereading has consistently shown itself to be an inferior technique to promote learning.

Karpicke & Blunt (2011) compared groups that had different number of reading opportunities and found that rereading enhanced performance for inference multiple-choice and short answer application test relative to a single reading. It is important to note that participants in the Karpicke & Blunt study were allowed to restudy the passage four items and the passages were short (approximately 300 words) than those typically assigned in college classes. As a result of this, the Karpicke and Blunt study may not have captured the complexity of typical text comprehension at the college level.

Self-Explanation Technique

The term 'self-explanation' was originally postulated by Chi, Bassok, Lewis, Reimann & Glaser (1989) as a potential learning activity in trying to understand how students are able to learn successfully from text material that are incomplete. Learning materials most times contain informational gaps or missions both in the text passages as well as the description of steps involved in a worked-out problem examples.

Dunlosky et al (2013) describes self-explanation technique as the process of explaining how new information is related to known or explaining steps taken during problem solving. It is known to be an effective strategy of explaining to-be-learnt material to oneself in order to understand the material.

Chiu and Chi (2014) in their study conducted by Chi et al (1994) asked eight-grade students to self-explain after reading each sentence of a passage on the human circulatory system. A comparison group of students read the same passage twice and were not asked to self-explain. The students who were prompted to self-explain understood more about the circulatory system than the comparison group. Within the self-explain group, the students who generated more self-explanations learned better than students who did not self-explain as often.

Distributed Practice

Sobel, Cepeda & Kapler (2011) taught fifth grade students (in America) definitions for several uncommon English words (e.g. abscond). Students learned these terms and definitions by means of an interactive tutorial that included oral practice, paper-and-pencil activities and instructor-led demonstrations. Students completed that tutorial twice, with both sessions either occurring on the same day (massed group) or on two separate days separated by one week (spaced group). Five weeks after completing the second tutorial, all students completed a final test over the vocabulary terms. On this test, retention of vocabulary definitions was significantly higher for students who repeated the tutorial after one week (20.7%) than students who repeated the tutorial on the same day (7.5%)

METHODOLOGY

Research Design

This study was quantitative research designed to determine the relationship between three categories of learning techniques - low utility (rereading technique), moderate utility (self-explanation technique), and high utility (distributed practice technique) and students' academic performance.

Research Population

The target population of the study consisted of ninety-six (96) JSS Two students randomly selected from Demonstration High School in Ondo West Local Government Area, Ondo State.

Sampling and Sampling Techniques

The purposive sampling technique, also known as judgment, selective or subjective sampling, was used in this research as three arms were selected from five arms of JSS2 class for this study. Ninety-six (96) subjects from three arms of JSS 2 class of Demonstration High School in Ondo West Local Government Area were purposively selected. The sample consisted of students of the same age group, class, and educational awareness. Each of the three arms was to study using different learning techniques (i.e. group A: Rereading technique; group B: Self-Explanation; and group C: Distributed Practice).

Research Instrument

A pretest and a posttest were used for this study developed by the researcher. The test was a free response test. In the pretest, general question about the planet were asked while in the post test questions from the passage taught was administered to the learners.

Procedure For Data Collection

The completion of research questions was done by the individual for effective result. The researcher began with an introductory lesson that lasted 45 minutes where she taught students from each group how to use their learning techniques.

On the Second day, the lesson began with the administration of a pretest to assess the students' prior knowledge on the topic. The test questions referred to the precursors of the Earth in the Solar system that should have been acquired at least to some extent (e.g., what is a solar system? How many planets are in our Solar system?). The overall high performance in prior knowledge test confirmed that the students of the three conditions possessed the required knowledge. After this pretest, students were engaged in a fourty-five (45) minutes lesson about *The Earth in the Solar system.* At the end of the lesson, each group of students were administered an immediate post-test to examine their performance. Students were required to complete the test tasks completely on their own. After the pretest, the researcher informed the students that they would be reassessed six weeks later. Each group was then encouraged to keep on studying using their learning techniques.

Six weeks later, a final post-test was administered after their last Self-Explanation, Rereading and Distributed Practice study opportunity. The test contained the same free response questions given immediately after instruction about The Earth in the Solar system (e.g., why

is Earth called a unique planet? The planet known as Earth's twin is known as .....?). It is important to note that no substantial help were given to the students by the experimenters during test sessions. Also, to prevent cheating and mutual help, students from the Rereading, Self-Explanation and Distributed Practice groups were mixed together and seated alternatively in all test sessions.

Method of Data Collection

The subjects were given Instruction immediately after a pre-test and were given an immediate post-test after instruction. The different groups who were categorised according to their learning techniques were further encouraged to go home and study using the newly learned learning techniques. After six weeks, they were re-tested on the same questions given during the post-test immediately after instruction. Data generated through the pre-test and post-tests were used to examine the impact of the three groups of learning techniques -low utility (Rereading), moderate utility (Self-Explanation) and high utility (Distributed practice) - in improving the academic performance of students.

Method of Data Analysis

Data collected on the research questions were presented in percentage, tables, t-test, ANCOVA and subsequently interpreted respectively. Data generated through the responses through the pretest and post-test questions were used to examine the impact of various learning techniques on improving students' academic performance.

RESULTS

The following results presented are based on the research hypotheses raised, which the study has sought to answer.

H_{01}: There is no significant difference between the academic performance of students who use distributed practice and students who used the rereading leaning technique

Table 4.1: Paired sample t-test summary showing differences between the academic performance of students who use distributed practice and the students who used the rereading leaning technique

Variable	Gender	N	Mean	S.D	DF	t	sig	P
Academic performance	Distributed practice	35	11.69	3.644	68	-.505	.147	<0.05
	Rereading Learning	35	12.06	2.376				

Source: field survey, (2024)

Table 4.1 reveals that there was no significant difference between the academic performance of students who used distributed practice and students who used the rereading leaning technique; t (68) = -.505, p>0.05. Thus the null hypothesis was accepted. This implies that the two learning techniques do not have any significant impact on the academic performance of students. The students' performance faired almost equally when subjected to the two techniques.

H_{02}: There is no significant difference between the academic performance of students who used distributed practice and students who used the self-explanation technique.

Table 4.2: Paired sample t-test summary showing differences between the academic performance of students who use distributed practice and the students who used the self-explanation technique

Variable	Gender	N	Mean	S.D	DF	t	sig	p
Academic performance	Distributed practice	35	11.69	3.644	68	4.114	.000	<0.05
	Self-explanation	35	8.29	3.259				

Source: field survey, (2024)

Table 4.3 reveals that there was a significant difference in the academic performance of students who use distributed practice and students who used self-explanation technique; t (68) = 4.114, $p<0.05$, $\eta^2 = 0.199$. Thus the null hypothesis was rejected. The table further reveals that students who used distributed practice (mean= 11.69) performed better than students who used the self-explanation technique (mean= 8.29). Size of effect ($\eta^2 = 0.199$) reveals that learning techniques had high effect (according to Cohen 1988 and Field 2000 rule of thumb for size of effect) on academic performance of students; that is, learning techniques accounted for 19.9% change in the academic performance of students.

H_{03}: There is no significant difference between the academic performance of students who use self-explanation and students who used rereading technique

Table 4.3: Paired sample t-test summary showing differences between the academic performance of students who use self-explanation and students who used rereading technique

Variable	Gender	N	Mean	S.D	DF	t	sig	p
Academic performance	Self-explanation	35	8.29	3.259	68	-5.532	.000	<0.05
	Rereading method	35	12.06	2.376				

Source: field survey, (2024)

Table 4.3 reveals that there was a significant difference in the academic performance of students who use self-explanation and students who used rereading technique; t (68) = -5.532, $p<0.05$, $\eta^2 = 0.31$ Thus the null hypothesis was rejected. The table further reveals that students who use rereading method (mean= 12.06) performed better than students who used the self-explanation technique (mean= 8.29). Size of effect ($\eta^2 = 0.31$) reveals that learning techniques had high effect (according to Cohen 1988 and Field 2000 rule of thumb for size of effect) on academic performance of students; that is, learning technique (rereading method) accounted for 31% change in the academic performance of students.

H_{04}: There is no significant interaction effect of the three teaching techniques on the academic performance of students

Table 4.4: ANCOVA Summary table for main effects of teaching techniques on Academic performance controlling for pretest on Academic performance.

Source of variance	Sum of squares	Degree of freedom	Mean square	F-ratio	Sig	Partial eta squared
Covariate (pretest Academic performance)	97.656	1	97.656	10.876	.001	.097
Main effects (teaching techniques)	352.447	2	176.223	19.626	.001	.280
Residual error	906.916	101	8.979			

Significant at .05 level.

Table 4.4 shows that when the pre-tests of Academic performance was covaried out, the main effect of teaching technique on post-test academic performance was significant F(2,101)= 19.625, p = .000, partial = .280. Following the removal of the effects of the covariate, there is a significant difference between the mean scores of the three teaching techniques (p<.005).

Table 4.5 One-way ANCOVA showing the main effect of teaching techniques when pre-test was co-varied out.

Source of Variance	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**
Corrected Model	400.075[a]	3	133.358	14.852	.000	.306
Intercept	338.303	1	338.303	37.676	.000	.272
Pretest	97.656	1	97.656	10.876	.001	.097
Teaching	352.447	2	176.223	19.625	.000	.280
Error	906.916	101	8.979			
Total	13275.000	105				
Corrected Total	1306.990	104				

Table 4.5 shows that when pre-test academic performance was co-varied out, the main effect of teaching technique on post-test academic performance was significant F(2,101) = 19.625, P = 0.00, partial η^2 = .280. Following the removal of the effects of the co-variate, there is a significant difference between the mean scores of the three teaching techniques (p<0.05).

Table 4.6: **showing the multiple comparison among the three teaching techniques on the academic performance of students**

Post test score	**Distributed practice**		**Self-explanation**		**Rereading Group**	
	Mean	St.D	Mean	St.D	Mean	St.D
	11.69[a]	3.64	8.29[b]	3.26	12.06[bc]	2.38

Note: Mean not sharing subscripts differ significantly at the 0.05 level

Group 1 indicated that Distributed practice and self-explanation technique are statistically different ($p<0.00$), Distributed practice and rereading group are not different ($p> 8.85$). Group 2 indicated that self-explanation and Distributed practice and rereading group are statistically different ($p<0.00$). However, Rereading group and self-explanation are not statistically different but Rereading group and Distributed practice are statistically different. Therefore, Distributed practice and self-explanation are statistically different from rereading group but distributed practice and self-explanation are not statistically different from each other.

DISCUSSION

The primary goal of the research was to explore the extent to which some major learning techniques improve the academic performance of students. Five experiments using three learning techniques yielded an inconsistent pattern of results: distributed practice and rereading techniques improves performance on both immediate and delayed test in contrast to self-explanation. Thus, the present research establishes a finding with important implications for students' academic improvement, given that learning techniques are techniques prevalently used by students who are typically preparing for delayed test. Below is my discussion of the results of the research hypothesis that may suggest directions for further research.

Ho_1: There is no significant difference between the academic performances of students who used the distributed practice and students who used the rereading learning technique.

Mean scores of this experiment revealed that there is no significant difference between students who used the distributed practice and students who used the rereading technique. Both techniques faired squarely with students in the distributed practice technique group having a mean score of 11.69 and students in the rereading group having a mean score of 12.06. This means there is no difference between the two techniques when utilized in improving the academic performance of students.

Ho_2: There is no significant difference between the academic performances of students who used the distributed practice and students who used the self-explanation technique.

The mean scores between students in the distributed practice group is 11.69 which is significantly higher than that of students in the self-explanation group who had a mean score of 8.69. This result is an indicator that the type of learning technique a student utilizes during the study of a material can have effect on his or her performance. It also shows that the utilization of the distributed practice technique during the study of a material may assist towards improving the performance of a student better than self-explanation technique.

Ho_4: There is no significant difference between the academic performances of students who used the self-explanation and students who used the rereading technique.

The results showed that students from rereading technique group performed significantly better than those in the self-explanation group. The rereading group had a mean score of 12.06 which is higher than 8.29, the mean score of self-explanation group. This result further supports the assertion that some learning techniques are more effective than others and the type of learning technique used by a student can determine his or her performance outcomes.

It also indicates that rereading technique may prove to be more effective for better student outcomes.

There is no significant main effect of the three learning techniques on the academic performance of students

When we examine the post-test mean scores of rereading group (12.06) and distributed practice (11.69) group are significantly greater than that of the self-explanation group (8.29). It reveals that distributed practice and rereading may be more effective in improving the academic performance of students than self-explanation. This result corroborates with the assertion that some learning techniques may be more effective in improving students' academic performance.

Conclusion

The result revealed that learning techniques may be capable of improving students' academic performance. And that the type of learning technique used by students can have an impact on their performance. For example, this study revealed that students who used distributed practice and rereading learning technique performed significantly better than students who used rereading technique.

The study also revealed that learning techniques are not 'miracle wands' that makes magic in learning happen. This implies that the student is who determined if a learning technique will improve his performance. And the result of this study proves that there was a positive and poor relationship between academic performance of students and learning techniques. Therefore, an increase in performance outcomes through the utilization of learning techniques depends on the students.

It is also important at this juncture to add that there is no one right learning technique. Rather students should be supplied with a tool box of strategies that have varying levels of effectiveness in different task context, content domains, and no various combinations with one another (Rawson, 2005). This means that some learning techniques are more effective in certain content domains, task context, etc. For instance, distributed practice enhances learning in more complex domains like mathematics (Wendi et al., 2020); self-explanation is best used to develop students' robust mental models of challenging conceptual domains like biology and; rereading is best used in language content domains because it focuses on getting information into the students' head.

The researchers would like to conclude that learning techniques are not being utilized by junior secondary students. The fact that most students are not aware of most of the effective learning techniques and how they can be used to improve their performance could be the reason student performance does not increase every session. And teachers are making very little effort towards exposing students to the effective learning techniques available and teaching students how they can be fully utilized.

It is obvious that if learning techniques can be utilized during the study of a learning content and if they are well utilized by students, the academic performance of students will improve

tremendously and this will encourage students to study harder as it has been discovered in this study.

Recommendations

In view of the research findings above, the following recommendations would be suggested to the government, schools, administrators, teachers and students

a. Government should provide funds for seminars, trainings and instructional resources for teachers in order to expose them to the effective learning techniques available and how they can be used to improve students' performance. This will not only improve teachers' effectiveness, it will also accelerate student outcomes in short and long term.
b. Teachers should expose students to the effective learning techniques available and encourage them to make use of the learning techniques more often in their study. Also, by utilization of some of the techniques while teaching will instill in them that consciousness of the potency of learning techniques. For instance, a teacher may begin his or her class by giving learners a pretest to review previous learning and end the class with a post-test to assess the students on new learning. This step alone can make the students more active towards learning thereby making them to study harder.
c. Teachers should also be encouraged by school heads to motivate students to learn, remove boredom and tedious theoretical explanation and at the same time, help students to achieve maximum academic attainments by encouraging students to make appropriate use of learning techniques.
d. Finally, having discovered the positive effect of the use of learning techniques in improving students' performance in the present study, students should take responsibility for their own learning by motivating and encouraging themselves in utilizing the effective learning techniques in other to improve their performance because it depends on them whether a learning technique will work or not.

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