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Effect of Guided Discovery Teaching Method under Individualized and Group Learning Conditions on Secondary Students Retention in Trigonometry in Katsina State

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Abstract. *This study is on impact of the use of Guided discovery teaching method under individualized and group learning conditions on secondary students' retention in trigonometry in Katsina Zonal Quality Assurance in Katsina State. The research adopted Quasi-experimental pre-test post-test control group design. Data were collected from a sample of 172 students comprising 95 boys and 77 girls from three randomly selected public schools in in Katsina Zonal Quality Assurance in Katsina State. The schools were grouped into experimental and control group. A 25 item instrument called Trigonometry Performance Test (TPT) were adopted from past WAEC, NECO and JAMB questions on Trigonometry with a reliability coefficient of 0.832 using Pearson Product Moment Correlation statistics with the aid of SPSS Package 21.0 version. The TPT was administered twice, before experiment (Pre) and two weeks after experiment (Post post test). Data collected were analyzed using descriptive statistics of mean and standard deviation for answering the research questions and One way ANOVA at coefficient alpha level of 0.05 for testing the hypotheses. Findings of the study are; there is significant difference between the retention mean performance scores of students taught trigonometry using guided discovery method with individualized learning strategy, guided discovery method with group learning strategy and lecture method. There is no significant difference in retention of male and female students taught trigonometry using guided discovery method with individualized learning and guided discovery method with group learning. It was recommended that Guide discovery either as individualized or group should be incorporated among instructional methods for teaching mathematics and teachers in training should be equipped with knowledge vast enough to implement guided discovery methods of teaching mathematics.*

Key words: *Guided discovery, Individualized and Group learning conditions, Retention and Trigonometry.*

Introduction

Mathematics is the language without which science, commerce, industry, the internet, and the entire global economic infrastructure are struck dumb (Sunday et al; 2021). Mathematics is regarded as pillar of almost all the streams in academics given its importance in tertiary education and most careers. It is not only beneficial but also essential. Hence, mathematics is not only a language and a subject of itself, but it is also critical in fostering logical and rigorous thinking, as such its influence in life is immense. Setidisho (2016) also maintained that mathematics is a fundamental science that is necessary for understanding most other fields in education. Setidisho further emphasized that it is glaring that no other subject forms such a strong force among the various branches of science. This implies that the place of mathematics in secondary school curriculum in Nigeria is paramount for scientific and human development as it serves both as a tool for academic progress in a chosen career and as a tool for preparing the individual for useful living.

Importance and contributions of Mathematics to the modern culture of science and technology was further acknowledged, and then asserted that without Mathematics there is no science, without science there is no modern technology and without modern technology there is no modern society (Imoko & Isa, 2015). Despite the importance attached to mathematics as key subject in realizing any nation's scientific and technological aspiration, it has experienced a flood of persistent high failure (Onah, 2015). This may be due to lack of innovative pedagogical strategy that will enable teachers meet the challenges of teaching of the subject especially in this era of information age.

The focus of this study is on trigonometry. Trigonometry is a branch of mathematics that studies relationships involving lengths and angles. Trigonometry, a fundamental branch of mathematics, plays a crucial role in various fields, including engineering, physics, and astronomy (Bekene & Machaba, 2022). However, many senior secondary school students find trigonometry challenging due to its abstract concepts and complex formulas (Abdullahi, 2022). Trigonometry functions are used to understand cyclic phenomena across many applications in fields such as adverse physics, mechanical and electrical engineering, music, astronomy and biology. According to Daniel (2016) Trigonometry is also the foundation of surveying. There is an enormous use of trigonometry and trigonometric function. For instance, the technique of triangulation is used in astronomy to measure the distance to nearby stars. The sine and cosine function are fundamental to theory of periodic function such as those that describe the sound and light waves (Daniel, 2016).

According to Ndukwe (2018) mathematics teaching demands the teachers using appropriate teaching methods that will give the students opportunity to be actively involved in teaching learning process. Teaching methods can broadly be categorized into two; expository and heuristic (Wachanga & Mwangi 2004). The expository methods are also referred to as conventional methods that are largely teacher centered where learners passively acquire knowledge as the teacher teaches and the students take notes without them being involved in class activities (Sunday et al; 2021). As noted by Salako, et al; 2019) a number of problems have been identified concerning these methods of teaching these include passivity of students, lack of collaborative learning and emphasis on theory. While the heuristic methods of teaching are learner centered. These methods are such that the learners are actively involved in the learning process. Learning is through inquiry and it is where flexibility and creativity are encouraged. The procedure through which this information is conveyed determines how long the students can retain this knowledge in their long-term memory (Nowugbeda et al; 2024).

This study set out to examine the effect of Guided discovery on students' retention in trigonometry as individuals and groups. This is because the approach enables increased interaction and personalized contact time among students and teachers. According to Efe and Suleiman, (2016) students take responsibility for their own learning and those who are not able to attend the class due to illness or extra-curricular activities such as athletics or fieldtrips are not ignored. In as much as efforts are being made to enhance students' achievement in mathematics, it is equally important to consider students' ability to retain what they have learnt. Retention means recalling pieces of knowledge, processes and skills that were learned earlier in time. Retention ability is another factor that influences performance of students in mathematics. Ezeoano (2019) it also refers to skill or knowledge or competences a learner has acquired and retained from a learning situation after

forgetting has taken place. Retention refers to the ability to remember or utilize already acquired knowledge or skills. It is the capacity to remember something, skills, knowledge, habits attitudes or other responses initially acquired. Retention plays an important role for what is learn to be effectively applied.

One of the goals of Mathematics teaching and learning is to develop the ability of learners to recognize a problem and apply the knowledge of mathematics to get the solution to the problem. The researchers believe that, if students are given the opportunity to experience mathematics through guided discovery as individual or in groups during mathematics lessons, their 'mathematics phobia' and sense of difficulty in the subject will vanish leading to greater positive productivity in all examinations as the students would learn better in activity based class.

Gender of learners is one of the factors that affect students' academic achievement and retention. Over some decades there has been evidence of growing gender gap in educational achievement in many countries. Gender bias in education is responsible for the inequality in opportunity, access, enrollment, curriculum, subject disciplines and several others (Gibb, et al, 2012). Review of studies show inconsistence on results of male and female students' achievement in mathematics public examination and in mathematics achievement tests. Reports from studies of Gambari, et al, (2014); Malik and Salman (2016), all show no significant differences among male and female students in mathematics achievement tests. However, Akpan (2017) indicates that there is significant difference among male and female students in mathematics achievement tests. Specifically, most of the studies did not examine the retention of male and female students in trigonometry but rather, mathematics in general. Since the guided discovery has been recognized as an activities based that does not recognize gender, but only keeps to instruction, it was necessary to find out if guided discovery learning strategy when used in teaching trigonometry would lead to bridging of gap in gender retention in trigonometry.

Owing to the interplay of these variables this study is designed to undertake the effect examine the effect of Guided Discovery Method with Individualized and Group Learning Strategies on Secondar y Students' retention in Trigonometry in Katsina Zonal Quality Assurance in Katsina State.

Purposes of the Study

The general purpose of this study is to undertake an effect of the Guided discovery teaching method under individualized and group learning conditions on secondary students' retention in trigonometry in Katsina Zonal Quality Assurance in Katsina State.

The specific objectives are to:

1. Find out the difference between retention ability scores of students taught trigonometry using gu ided discovery method under individualized learning condition, guided discovery method with group learning condition and lecture method.
2. Find out the difference between retention ability scores of the male and female students taught trigonometry using guided discovery method under individualized learning condition and guided discovery method with group learning condition.

Research Questions

The following research questions were raised, to guide the study:

1. What is the difference between retention ability scores of students taught trigonometry using gui ded discovery method under individualized learning condition, guided discovery method with group learning condition and lecture method?
2. What is the difference between retention ability scores of the male and female students taught trigonometry using guided discovery method under individualized learning condition and guided discovery method under group learning condition?

Research Hypotheses

The following hypotheses were formulated will be tested at 0.05 level of significance.

Ho_1: There is no significant difference between retention ability scores of students taught trigonome -try using guided discovery method under individualized learning condition, guided discovery method with group learning condition and lecture method.

Ho_2: There is no significant difference between retention ability scores of the male and female students taught trigonometry using guided discovery method under individualized learning condition and guided discovery method under group learning condition

Scope and Delimitation of the Study

This study aimed at carrying out an impact of the Guided discovery teaching method under individualized and group learning conditions on secondary students' retention in trigonometry in Katsina Zonal Quality Assurance in Katsina State. The research would be restricted to only public schools in Katsina Zonal Quality Assurance in Katsina State. Public schools were chosen for the study because they have many arms of the same class and many students in each class, this made it easy for school authority to release one arm each from the selected schools. Unlike private schools that have small population which may not allow the school authority to easily released one arm. The study would be limited to co-educational schools that have SSII class as at the time of this study. The reason for choosing this level of students was that it is a more stable class in addition to being reasonably exposed to mathematics concept in the senior secondary school syllabus and they are not yet very close to writing their external examination. Only the content of the SSII mathematics syllabus for the third term (2022/2023 session) was used to carry out this research work.

Significance of the Study

This study would be of benefit to students, mathematics teachers, textbook authors, curriculum planner, school administrators and professional bodies, and contributes to existing literature in the following ways:

The findings will be of immense benefit to students who will be spurred to greater achievements in mathematics as they would have knowledge of guided discovery (individualized and group learning). The findings of this study would encourage active classroom participation, interaction, interpersonal relationship and build their self-confidence and get them always prepared for meaningful learning.

The study could be useful to mathematics teachers to re-adjust their methods and approaches of teaching mathematics. This could give yield to a better performance, high and greater efficiency in the subject. It would also expose them to the varying individual differences of students with respect to mathematics.

Text book author would also make use of the findings of this work to design the textbooks so as to accommodate teaching and learning of mathematics using guided discovery and demonstration methods with individualized and group learning.

The findings may thus; help curriculum planers to modify the curriculum contents to match the innovative method which are learner centered and therefore could lead to sustainable learning.

Also, its hoped that the finding would encourage school administrators, government, non-governmental organizations, and professional bodies like Science Teachers Association of Nigeria (STAN), Nigeria Educational Research and Development Council (NERDC) and others stakeholders in education sense that the findings can enable them to know whether seminars and workshops should be held in order to retrain teachers on the best ways and approach of teaching mathematics. The study is an academic research work and would add to the existing stock of knowledge as well as serve as a basis of reference in future studies in the field of mathematics education

Concept of Guided Discovery Strategy

The guided discovery strategy is described by Akerson, et al, (2017) as a student –centered, activity – oriented teaching strategy in which the teacher directs students through problem – solving approach to discover answers to instructional topic at hand. Nwanze (2016) in his opinion described guided discovery as a style or method of teaching where the learner with minimum guidance from the teacher

seeks to discover and create answer to a recognized problem through procedure of making a diligent search. The guided discovery demands that students are given a problem to solve and sometimes the necessary materials; they design their own procedures, collect related data, and formulate hypotheses. The teacher guides the students with orientating questions. By doing so, guided discovery ensures full engagement of the learner in a given task and enhances students' acquisition of science process skills (Kuang, et al, 2022).

From these perspectives, it can be said that guided discovery -based teaching is the way of teaching where students are actively engaged in the process of getting or searching certain planned knowledge or information through various ways used by scientists or discovery -based activities. These ways include asking questions, formulating a hypothesis, making observations, collecting data, recording, and interpreting, and communicating the results (Kinyota, 2020). Guided discovery learning is intentional learning through problem solving under supervision. It is an instructional is a learning situation in which the principal content of learning is not directly exposed by the teacher, but left to be discovered by the learner, making the teacher a guardian and students active participants in the learning process.

Concept of Retention in Mathematics

Retention of concepts learnt assists in reflective thinking and the retained concepts could be used. A number of studies have indicated that teaching methodology can improve learner's retention level. Retention, which is the act of retaining, may be defined as the act of 'absorbing and holding' or 'continue having or holding'. In the context of this work, retention to the act of absorbing, holding or continuing to hold or have facts or things learned. Retention, as a variable is the ability to remember things, task or material learned previously. It is the endurance of behavior, which have been learned or acquired when the behavior is not being utilized.

Retention ability involves the ability to learners to remember an instruction given. It is the ability of a learner to demonstrate his/her cognitive skill in the subject. The process of retention has been described by the Rundell and Michael (2014) as the ability to remember ideas and facts. Retention, thus depends mainly on the teaching strategy adopted by the teacher. According to Akubuilo (2014), any instructional model, which elicits adequate student participation, has profound effects on students' retention ability.

Aggarwal (2017) is of the view that 'the term retention is the process of relegation of the past experience in the sub-conscious mind of the individual in the form of mental experience'. It is worrisome seeing students' consistent poor achievement and retention in this all important subject (Mathematics). From the above one can allude that the ability to retain information depends on many variables such as time interval between when learning occurred and retrieval, intervening experiences, environment, instructional strategies/material used, specific subject involved, etc. These variables, in one way of the other, affect retention ability adversely.

Theoretical Framework

Bruner's Cognitive Developmental Theory of Instruction

Bruner propounded a theory of instruction named "Cognitive Developmental Theory" in 1964. The theory states that the instruction is prescriptive and normative. It is prescriptive in the sense that it proposes rules for achieving knowledge of skills and provides techniques for evaluating learning out comes. It is also normative in the sense that it set goals to be achieved and deals with conditions for meeting them. This is not to say that learning and developmental theories are irrelevant for theory of instruction. In fact, a theory of instruction must be concern with both learning and development and must be congruent with those theories of learning and development to which it subscribes. Bruner is insistent on the empirical steps necessary before the theory compressible the practice. Bruner has specified four features that a theory of instruction must involve:

Predisposition to learn: A theory or instruction must concern with the experiences and context that will tend to make the child willing and able to learn when he enters the school.

Structure of Knowledge: A theory of instruction should specify the ways in which body of knowledge should be structured so that it can be most readily grasped by the learners.

Sequence of Instruction: A theory of instruction should specify the most effective sequences to present the material.

Reinforcement: A theory of instruction should specify the nature and pacing of rewards, moving from extrinsic rewards to intrinsic one.

The relationship of Bruner's Cognitive Developmental theory of instruction to teaching of chemistry is that mathematics needs to be thought in sequence. Starting from known to unknown, simple to complex. This theory is about proposing the rules for achieving knowledge and also dealing with condition for meeting the goals set to be achieved.

Review of Empirical Studies

Akanbi and Kolawole (2014) examined the effects of guided discovery (GD) and self-learning (SL) strategies on senior secondary school students' achievement in Biology. The pretest-posttest control group quasi-experimental design with 3x2x2 factorial matrix was adopted. Two hundred and forty (240) SS2students from six purposively selected senior secondary schools in two local government areas of Oyo State were used for the study. The schools were randomly assigned to experimental (GD and SL) and control (CS) groups and the study lasted for fourteen weeks. Six instruments used were: Teachers Instructional Guides for teachers using the two treatments and control group; Students Environmental Achievement Test (r=0.80), Cognitive Style Test (test-retest r=0.81) and Assessment Sheet for evaluating research assistants. Three null hypotheses were tested at 0.05 levels of significance. Their data were analyzed using ANCOVA and Scheffe post hoc test. Treatment had significant main effect on students' achievement score ($F(2,227) = 197.804$; $p < 0.05$). SL enhanced achievement scores ($x = 14.59$) than GD ($x = 14.20$) and CS ($x = 12.53$). Self-learning and guided discovery strategies improved students' achievement in Biology.

Abari and Ikyule(2021) investigated the effect of guided discovery approach on Students' Academic Achievement in Mathematics in Senior Secondary Schools in Ushongo Local Government Area, Benue state, Nigeria, with a view to establishing whether or not guided-discovery teaching approach would have effect on students‟ achievement in Mathematics. The study raised two specific objectives, two research questions and two related null hypotheses. 120 students were randomly selected for the study as the sample. The instrument for the study was mathematics achievement test. Research questions were answered using mean and standard deviation while analysis of covariance (ANCOVA) was employed in testing null hypotheses at 0.05 level of significance. The findings revealed no significant difference in mean achievement scores of students taught mathematics using Guided-discovery teaching method and those taught with lecture method. The findings also revealed no significant difference in mean achievement scores of male and female students taught Mathematics using Guided discovery approach.

The present study is similar to the past study in the following areas. The research design for both studies is quasi-experimental research design; both studies focused on mathematics academic performance, the data obtained in both studies were analyzed using mean and standard deviation for research questions. However, the present study differs in the following areas: the location for the present study is North-west state (Katsina) while the location of the past study is in South- South (Akwa-Ibom) Nigeria; the sample size for this present study is 172 intact classes of SSII mathematics students while the past study 120 mathematics students. The reviewed work used analysis of covariance (ANCOVA) to test all the hypotheses while the present study used analysis of variance (ANOVA) to test all the hypotheses raised at 0.05 level of significance. But the revealed work did not tailor to Retention which is the gaps that the current work wants to fill.

METHODOLOGY

Adopted for this study is quasi-experimental design with emphasis on pre-test, post-test non-randomize control group. The reason for the adoption of this design is based on the fact that students in the class was taught with guided discovery method with individualized and guided discovery

method with group learning strategy or conventional teaching method, in other words, there was no randomization of the students for the treatment. The study used two experimental group and a control group. Students in the experimental group were exposed to either guided discovery method with individualized or guided discovery method with group learning strategy while the control grou p was taught with conventional method.

The schools were randomly assigned to experimental and control groups through balloting while treatment type was also randomly assigned to each of the experimental schools through balloting .The experimental groups comprised 63 male and 51 female students and the control group comprised 32 male and 26 female students, making a total of 172 students. A Trigonometry Performance Test (TPT) was used to collect data for the study. The TPT were adopted from past WAEC, NECO and JAMB questions on Trigonometry. Twenty –five (25) items were put together following specifications on a test blue print. Each of the 25 items was a multiple-choice objective question with four options (A, B, C, and D). Time allowed was one hour. The Trigonometry Performance Test (TPT) was content validated with the use of a Table of Specification (Test Blueprint) in constructing the test items. Having completed the construction of the TPT, it was face-validated by three experts from Mathematics Education Department of Umaru Musa Yar'adua University. The experts' pieces of advice were adhered to in terms of content relevance of the test items. Corrections and suggestions made by the experts were used to review the TPT. The TPT was pilot tested twice using split half with SSII students of a Senor secondary school with in Katsina Zonal Quality Assurance in Katsina State which was not part of the main study. Product Moment Correlation Coefficient statistics with the aid of SPSS Package 21.0 version. From the result obtained, reliability of the instrument was found to be (r = 0.832). This signifies that there is strong positive relationship between the first and the second result of TPT administered.

Both the experimental and control group was subjected to pre-testing sessions before treatment. After experimental groups were taught Trigonometry with either guided discovery method with individualized or guided discovery method with group learning strategy while the control group was taught with the conventional method. Teaching lasted for six weeks covering Bearing and Distance and Angles of Elevation and Depression aspect of Trigonometry after which a posttest was administered.

Data collected was analyzed with respect to the research questions and hypotheses formulated for the study. Descriptive statistics of mean and standard deviations was used to answer all the research questions. Inferential statistics of ANOVA (for comparing means of at least three variables) was used to test all the hypotheses, as the case required, at significant level of 0.05.

Data Analysis and Result

Research Question One: What is the difference between retention ability scores of students taught trigonometry using guided discovery method under individualized learning condition, guided discov ery method with group learning condition and lecture method?

Table 1.1: Descriptive Statistics of the Retention Ability Scores of Experimental 1 and 2 and Control Group

Groups	N	Mean	Std.	Mean difference		
				GWIL	GWGL	LM
EG1: GWIL	65	69.18	12.546	0.00	4.164	21.271
EG2: GWGLS	49	65.02	12.275	-4.164	0.00	17.107
Lecture Method	58	47.91	9.015	-21.271	-17.107	0.00

Table 1 shows that, the difference between the mean retention ability scores of the students taught trigonometry using Guided discovery under individualized learning condition (M=69.18, SD= 12.546) and Guided discovery under group learning condition (M=65.02, SD= 12.275) is 4.164, difference between the mean retention ability scores of the students taught trigonometry using Guided

discovery under individualized learning strategy (M=69.18, SD= 12.546) and conventional method is (M=47.91, SD=9.015) is 17.107 in favor of Guided discovery under individualized learning condition. However, table 1 also show that, the difference between the retention mean scores of the students taught trigonometry using Guided discovery under group learning condition (M=65.02, SD= 12.275) and conventional method is (M=47.91, SD=9.015) is 21.271 in favor of Guided discovery under group learning condition.

Research Question Two: What is the difference between retention ability scores of the male and female students taught trigonometry using guided discovery method under individualized learning condition and guided discovery method under group learning condition?

Table 1.2: Descriptive Statistics of Retention Ability Scores of Male and Female Students in Experimental Group 1 and Experimental Group 2.

	Gender	N	Mean	SD	SEM	MD
EG1: GDWIL	Male	36	69.47	13.039	2.173	0.645
	Female	29	68.83	12.125	2.251	
EG2: GDWGL	Male	28	64.43	12.583	2.378	1.381
	Female	21	65.81	12.115	2.644	

Table 2, it could see that the difference between the mean retention ability scores of the Male (M=69.47, SD= 13.039) and Female (M=68.83, SD= 12.125) taught trigonometry using Guided discovery under individualized learning condition is 0.645. Also it could see that the difference between the mean retention scores of the Male (M=64.43, SD= 2.378) and Female (M=65.81, SD= 12.115) taught trigonometry using guided discovery under group learning condition is 1.381. However, the table also shows that the male students retained better then female students when taught trigonometry using Guided discovery under individualized learning condition and guided discovery under group learning strategy are gender friendly.

Testing of Hypotheses

The hypotheses formulated are tested using ANOVA and independent t-test analysis between the variables involved. The null hypothesis is rejected when the p-value is less than the alpha value of 0.05 and otherwise is retained

Hypothesis One

H_{01}: There is no significant difference between retention ability scores of students taught trigonome try using guided discovery method under individualized learning condition, guided discovery method with group learning condition and lecture method.

The hypothesis was tested using one-way ANOVA statistical technique. Results were presented in Table 1.3.a

Table 1.3.a: One-Way ANOVA Results of Retention Mean Performance Scores of Experimental 1 and 2 and Control Group.

	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**	**Decision**
Between Groups	15073.434	2	7536.717	58.056	0.000	Significant
Within Groups	21939.333	169	129.819			
Total	37012.767	171				

**Significant at $p \leq 0.05$*

Table 3.a show that the difference between the mean retention ability scores of experimental 1 (i.e., students taught trigonometry using guided discovery method under individualized learning condition (M = 69.18, SD = 12.546), experimental group 2 (i.e., students taught trigonometry using guided discovery method under group learning condition (M = 65.02, SD = 12.275)) and control group (i.e., students taught trigonometry using lecture method (M = 47.91, SD = 9.015)) is significant (F-value $_{(2,169)}$ = 58.056, P<0.05).

Table 1.3.b: Multiple Comparisons of retention ability between GDWIL, GDWGL and Lecture Method.

(I) GROUPS	(J) GROUPS	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
GDWILC	GDWGLC	4.164	2.156	.133	-.93	9.26
	Lecture method	21.271*	2.058	.000	16.40	26.14
GDWGLC	GDWIL	-4.164	2.156	.133	-9.26	.93
	Lecture method	17.107*	2.211	.000	11.88	22.33
Lecture method	GDWILC	-21.271*	2.058	.000	-26.14	-16.40
	GDWGLC	-17.107*	2.211	.000	-22.33	-11.88
*. The mean difference is significant at the 0.05 level.						

Key: GDWILC (Guided Discovery under Individualized Learning Condition), GDWGLC (Guided Discovery method under Group Learning Condition)

Table 3.b show the Tuekey's HSD post hoc test revealed significant differences in test scores between Experimental Group 1 and control group (0.000) and between experimental group 2 and control group (0.000). However, there was no significant difference between experimental group 1 and 2 (0.133). These results suggest that students taught trigonometry guided discovery method under individualized learning strategy and guided discovery method under group learning strategy performed better significantly then those taught using lecture method. While there was no significant difference in test scores between students using experimental group 1 and 2.

Hypothesis Two

H_{02}: There is no significant difference between retention ability scores of the male and female students taught trigonometry using guided discovery method under individualized learning condition and guided discovery method under group learning condition.

The hypothesis was tested using independent t-test results were presented in Table 4

Table 1.4: T-test Analysis of the Mean Retention Ability Scores of Male and Female Students in Experimental Group 1 and 2.

Group	Gender	N	Mean	SD	Df	T	p	Decision
EG1: GDWIL	Male	36	69.47	13.039	63	.204	.839	Retained
	Female	29	68.83	12.125				
EG2: GDWGL	Male	28	64.43	12.583	47	.386	.701	Retained
	Female	21	65.81	12.115				

**Significant at $p \leq 0.05$*

Table 4, it could see that the difference between the mean retention ability scores of the Male (M=69.47, SD= 13.039) and Female (M=68.83, SD= 12.125) taught trigonometry using Guided discovery under individualized learning condition is ($t_{(63)} = 1.812$, $p = 0.204 > 0.05$). Also it could see that the difference between the mean retention ability scores of the Male (M=64.43, SD= 2.378) and Female (M=65.81, SD= 12.115) taught trigonometry using guided discovery under group learning strategy is ($t_{(47)} = 0.386$, $p = 0.701 > 0.05$). However, there is no significant difference between the mean retention ability scores of Male and Female students taught trigonometry using guided discovery method under individualized learning condition and guided discovery method under group learning condition.

Summary of Major Findings

The major findings of this study were as follows:

1. The retention ability in trigonometry of those students taught guided discovery method under individualized learning condition, guided discovery method under group learning condition was significantly higher than those students taught using the lecture method.
2. Both male and female students' retention ability in trigonometry are equally well when taught using guided discovery method under individualized learning condition and guided discovery method under group learning condition.

Discussion of Findings

The finding revealed that, there was significant difference between retention ability in trigonometry of those students taught guided discovery method, individualized learning, guided discovery method under group learning and lecture method. This finding is in line with finding of Akanbi and Kolawole (2014) say that guided discovery improves students' retention ability. Both male and female students retention ability in trigonometry are equally well when taught using guided discovery method under individualized learning strategy and guided discovery method under group learning. The finding is in line with that of Akanbi and Kolawole (2014) which revealed that there is no significant difference the male and female retention ability.

Conclusions

From the findings of the study, the following conclusions could be drawn: Students retained more in Guided discovery method under individualized learning strategy and guided discovery method under group learning strategy are more effective than conventional lecture method for enhanced performance in trigonometry. It could also be concluded from this study that guided discovery meth od as an instructional tool enhanced students' retention in trigonometry irrespective of gender. This implies that if mathematics teachers use guided discovery method which is found to have enhanced students' retention, the issue of low achievement in mathematics at the senior secondary school level may become a thing of the past. Similarly, the gender gap created by continued use of unfavorable learning strategies in trigonometry could also be bridged with guided discovery method.

Recommendations

Based on the results and findings of this study, the following recommendations were made:

1. Guide discovery either as individualized or group should be incorporated among instructional methods for teaching mathematics.
2. Teachers in training should be equipped with knowledge vast enough to implement guided discovery methods of teaching mathematics.

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