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EFFECTS OF TEACHING METHODS, GENDER AND SCHOOL LOCATION ON THE PERFORMANCE OF SECONDARY SCHOOL STUDENTS IN MATHEMATIC: IN KANO STATE

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DEDICATION

This work is dedicated to my beloved parents Late Alh. Abdullahi Mohammad and Hajiya

Aishatu Abdullahi Muhammad and their entire family.

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Tsagem and Babangida Saidu Isa, I cherish our knowing each other may Almighty Allah (SWT) maintain our friendship forever.

The effort of my entire family most especially my beloved wives (Halimatus Sadiyya and Firdausi), my children, my typist Haruna Ma'aka, friends and well wishers is highly appreciated.

To all I say remain blessed.

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ABSTRACT

This study was carried out to investigate the effects of teaching methods (Discovery and lecture method), gender and school location on the performance of secondary school students in mathematics. A proportionate random sample of 356 senior secondary students was drawn from 20 secondary schools from Kano central senatorial zone using Morgan and Krejcie (1970) table for determining sample size. The sample was drawn from urban/rural dichotomy and gender wise. The sampled students were put into two groups i.e. experimental and control group. Four different mathematics topics were taught to both groups using discovery and lecture methods for experimental and control group respectively. Pre-test and Post-test were administered on both groups before and after treatment respectively. The results of the data collected from their performance were analyzed using t-test statistic. The results of the study revealed that experimental group performed better than the control group. The result also showed that boys performed significantly better than girls and urban students performed better than their rural counterpart. It was therefore recommended that teachers should adopt the use of discovery method in teaching mathematics. Cultural stigma which relegates female to mere housekeepers should be discouraged in our society. Moreover government should come to the aid of schools mostly in rural areas with necessary teaching materials to facilitate the teaching and learning activities.

CHAPTER ONE

INTRODUCTION

1.1   Background to the study

Mathematics being the pivot at which all the sciences are turning and the remarkable role it plays in sciences and technology, especially during this era of computer age, made it necessary to include in mathematics curriculum a wide range of activities that could be applied to solve scientific and other related problems

The vital role played by mathematics in sciences and technology coupled with changes in our modern society called for the reposition of mathematics education so as to keep abreast with these changes in our contemporary society.

Upon all attempts by various governments to popularize the teaching and learning of mathematics, poor results were and are still being recorded in our secondary schools through universities. This is an indication that something has gone wrong in teaching mathematics.

Odili (2006) classified problems of teaching mathematics into three broad categories viz.

 i.   Mathematics Issues: This comprises of content curriculum, organization and understanding of ideas

 ii. Pedagogical issues: This consists of instructional methods, classroom organization, the teacher himself and the government, he further observed problem of classroom organization to include the number of students per class, size of the classroom, availability of spaces and facilities. He opined that in our school no class has fewer than 50 students and managing such

students will be difficult by one teacher.

iii. Psychological Issues: This encompasses individual differences, attitude, interest and motivation.

Despite that fact that teaching mathematics is faced with multifaceted problems, accusing fingers are always pointed to the teachers and hence were held scapegoat for student's poor academic performance. The truth of the matter is that unless all the problems are squarely addressed, it would be impossible to realise the objective of teaching mathematics

The choice of this topic emanated from the yearning call on the current world trend on the promotion of gender equality, empowerment of women and eliminating of gender inequality, so as to ensure fair role expectation from both sexes towards development of a society.

The success or failure of students in mathematics studies has always been attributed to student and teachers' attitude, commitment and enthusiasm towards mathematics. Mental readiness of student will significantly determine whether he is internally or externally motivated to learn mathematics. Teacher's character, personality and how he portrays himself to his students influence students' altitude towards his subject.

Lack of proper counseling also contributed to the student's poor academic performance in mathematics. Most mathematics teachers just teach mathematics without relating it to a real life situation. Teachers should lead students to come to understand how mathematics education permeates into almost all aspect of human endeavor. This will consequently establish strong bond between mathematics and other disciplines.

Though some aspects of mathematics are abstract in nature, effort should be made by the teacher to teach it in such a way that all students would be carried along in solving problems. That is to say that mathematics should be taught in an explorative approach (discovery method) in which students should be active participant in identifying the source and solutions of their problems.

Discovery method or scientific method as it is alternatively called is a method of teaching that employs the use of audio visual aids which adds a variety to the methods of teaching by giving depth and breadth which make the learning process more pleasant and meaningful.

Frecmont (1989) suggested that by deriving mathematical expressions from a physical experiment and using symbols to describe inherent relationship youngster may be helped to learn the language of mathematics and thus improve their result.

Lecture method on the other hand is usually a talk and chalk method without much participation of student in the teaching and learning process, in lecture method, students are passive receivers of information with minimal participation in solving a problem in the class.

It is not uncommon in our secondary schools to find that many students were and are still running away from mathematics class simply because they have already imbibed the idea that mathematics is a difficult subject and they therefore consider it an object of fear.

This ugly trend coupled with the mystification of the subject by some mathematics teachers call for proper counseling of students by disabusing their minds from erroneous conception of the dreadful nature of mathematics. Igboko

(1980) strongly advocated the discovery method since it has the following advantages over the lecture method.

i. It encourages initiative and imaginal thinking.

ii. It leads learner lo discover rather than to tell him the matter at hand.

iii. It demonstrates same thing in several different ways to heighten the learner's interest and deepen his thoughts.

1.2 Statement of the Problem

The birth of computer which led to globalization had totally transformed our ways of living be it social, economic or scientific into modern society. To assimilate these changes mathematics should be dynamic and focused on addressing the pressing needs of our society. To commensurate with these needs, this research was carried out to determine the effect of teaching methods (Discovery, and Lecture), gender, and school location on students' performance in mathematics in Kano State.

1.3 Purpose of the Study

As stated earlier, teaching mathematics is faced with multifaceted problems, it .appears cumbersome to address the entire problems single handedly by one researcher. This research attempts to:

i. Determine the impact of teaching methods (Discovery and lecture method) on students' performance in mathematics.

ii. Determine whether gender has effect on students' academic performance in mathematics.

iii. Determine the effect of school location on students' performance in

mathematics.

1.4 Research Questions

Research of any type must always poise to solve a particular problem or proffers solution to some problems under study.

This research attempted to pursue answers to the following research questions:

i.   Does method used in teaching mathematics has any significant effect on students performance?

ii.   Does gender has any significant effect on learning mathematics?

iii.   Does school location (urban-rural) has any significant effect on students' performance in mathematics?

1.5 Research Hypotheses

The following null hypotheses are formulated to guide the study, they would be tested at 0.05 level of significance. These hypotheses are used to answer the research questions raised above.

i.   There is no significant difference between the average performance of students taught using Discovery method and those taught using lecture method.

ii.   There is no significant difference between the mathematics performance of males and those of the females in Secondary Schools.

iii.   There is no significant difference between the average performance of urban and those of the rural secondary school students.

1.6 Significance of the Study

The relevance of research in any field of human endeavor cannot be over emphasized. As the contemporary world is filled with range of choices and alternatives, research will help in making rational choice that will conform with principle of optimality.

Curriculum planners in mathematics education may incorporate the varying results generated from similar studies to set up a programme that will address the pressing needs of the society.

The result of the findings may also be used by education planners in deciding where to locate or site a school so as to ensure equitable or even opportunity to education.

1.7 Scope and Delimitation of the Study

The enormity of the task of undertaking research of this type coupled with financial constrains and time factor forced the researcher to limit the work to only one state i.e. Kano State.

Even in the state, only public senior secondary schools in Kano central senatorial zone were considered. Moreover the work is narrowed to only four mathematics topics in secondary school mathematics. (Indices and logarithm, Pythagoras' theorem, area of triangles and volumes of cone and cylinder). No aspect of applied mathematics is considered. Moreover the data gathering technique would be teacher made achievement test i.e. Pre-test and Post-test.

Hence the findings and the conclusions generated from this study could be more applicable to the participating students and possibly to the participating schools

and should equally be limited to the four mathematics topics considered.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

Just like any other profession, teaching profession in general and teaching mathematics in particular calls for the teacher to apply his profession integrity toward the success of his profession.

Professional integrity goes beyond the mastery of the subject matter, but involves application of all skills and techniques that would ensure overall development of student toward acquisition of mathematics concepts, skills and competency. This means the teacher should play the role of a teacher, counselor, and comforter and be the role model to his students.

Beside all these, government, students and parents each has a vital role to play towards achieving the set out goals. Researches were conducted by educationists, planners and administrators towards improving the teaching of mathematic. However, contrasting views on the measures to be taken to tackle the lingering problem in mathematics education emerged. But no one will dispute the fact that most problems identified by the researchers centered on teachers personality, our value system, instructional strategies poor counseling services, and students attitude towards mathematics.

This study however reviewed related literature in the light of the (1) effect of teaching method on students' performance in mathematics. (2) Effect of gender on

students' performance in mathematics. (3) Effect of school location (urban and rural) on students' performance in mathematics.

2.2 Effect of Teaching Method on Students' Performance in Mathematics

The Success or otherwise of the teaching and learning encounter depends to a very large extent on the teacher and the method he employs in teaching.

Discovery method of teaching however tasked the teacher to provide a rich physical environment, encourage the child to experiment, but realizes the differences between physical knowledge which may be invented.

Riasat (2010) investigated the effect of using problem solving method of teaching mathematics and concluded that scientific method (problem solving) is more effective method of instruction for teaching mathematics as compared to traditional method.

In an attempt to find the effect of using mathematics laboratory in teaching mathematics on the achievement of mathematics students, Ebele (2008) observed that boys had mean grade of 26.8 while girls had a mean 28.9. He thus concluded that there was no significant difference in achievement of male and female mathematics when taught with mathematics laboratory.

Lecture method is the type of teaching method whereby the teacher dominated teaching scenario, he talks, explain, and demonstrate a certain concept to his students without much involvement of students in the lesson. The information is transmitted in one direction, i.e. it flows from the teacher to the student.

Dean cited in Odili (2006) opine that the popularity of the lecture method as thus:-

It is mathematically neat and complete as each lesson contains a presentation and explanation of mathematics which it boost the teacher to get satisfaction from

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presenting complete syllabus in a sequence of lessons.

The teacher himself has often successfully learnt school mathematics in this way and expects his pupils to do likewise.

Kajuru (2006) discovered that among the factors that influence the achievement of leaner's in school mathematics are teacher's effectiveness as measured through the acquisition and use of good instructional skills and methodologies which appear very prominent. He further maintained that low achievement of school mathematics of learners have been attributed to poor and ineffective instructional skills and methodologies by mathematics teachers. One major problem associated with teaching and learning of mathematics is the students' inability to apply correct algorithm to solve a given problem. This problem stemmed from teacher's inability to use a qualitative instructional strategy in teaching.

Galadima (2002) observed that problem of poor quality of instructional technique in mathematics can be minimized to a large extent if teachers are well equipped with various types of instructional technique including heuristic approach.

Another lingering problem in teaching and learning of mathematics is the students, nonchalant attitude toward mathematics they took thing for granted, whereas for one to acquire and master mathematics skills, he needs to be very serious and committed to its acquisition, as the saying goes, there is no substitute for hard work.

Amoo (2002) opined that students attitude toward mathematics, the societal problem (exam malpractices related syndrome) and government insensitivity to issues, reflect in majority of the students who register for senior secondary certificate (SSCE) every year to come out with partial or total failure in mathematics.

In the same vein Aiyedun (2001) identified negative altitudes, lack of seriousness,

and very poor academic ability in mathematics as major contributing problems on the part of student

Viewed from teacher's side Azuka (2001) sees problem of teacher rank very high, among the problem of our educational system. He insisted that what the teacher knows and does can make a difference and what he does not know or fails to do can be an irreparable loss to the child. Another problem encountered in teaching/learning of mathematics is the lack of societal prestige for the teachers in general mathematics in particular. This causes the profession a low profile in our society. A qualified professional mathematics teacher leaves his field and seek for a white collar job with high and lucrative pay: this consequently leads to a braindrain in mathematics education.

Azuka (2001) further asserted that teaching profession in Nigeria is faced with many problems including low social prestige and is considered by many and see it as a "halfway house" from which they may be able to move on to a more remunerative occupation. This problem led to recruitment of unqualified mathematics teachers. excess work load on teachers, and consequently forced teachers to engage in other money generating ventures so as to keep body and soul together.

Abubakar (1999) opined that it is almost impossible to be innovative in teaching/learning of mathematics if the stereo typed (chalk & talk) teaching method is adopted for mathematics instruction.

To address another lingering problem of teaching mathematics is for teachers to imbibe the spirit of improvisation so as to make teaching and learning more lively and inspiring. Igbokwe (1997) held that improvisation has underscore the idea of laboratory movement in mathematics which has at its grassroot the intention of making mathematics learning practical, exciting interesting meaningful and utilitarian in outlook.

In the same vein Aguele (1997) observed that in our present situation, with classroom deprived of facilities, the need to rely on local material as a way of enhancing classroom effectiveness of teacher need to be over emphasized.

As the world is transforming from traditional to modern society, the ideas, hopes values and aspiration of the society is changing, thus, the method, strategies for realizing these aspirations must change, hence the need to improve our teaching strategy or method is obvious.

For effective teaching and learning to take place, mathematics teacher should plan classroom experience that creates a supportive environment for learning. Academic conducive atmosphere is very necessary during teacher student interaction session. Teaching in an overcrowded class will significantly impede the acquisition of mathematical skills in classroom.

Most of classes in our public schools were filled to capacity with students for normal lesson/lecture and this forced them to assume any uncomfortable posture to take lesson. This unbecoming trend has strong adverse effect on learning mathematics.

2.3 Effect of Gender on Learning Mathematics

Gender refers to the biological and sexual characteristics by which person is identified as male or female. It also classified socially defined sex roles, attitude and value which various societies seek to recognize as appropriate for one sex or the other. The effect of gender and school location on students academic achievement has been a subject of discussion and attracted many people to embark on research in the field. Many people held the view that gender has effect on students' achievement in mathematics though this notion was not based on any empirical research.

Aminu (2008) in an attempt to find the effect of gender on students' achievement observed that there is significant difference in the performance of boys over girls in his self developed mathematics test.

Mercy (2007) reveals that any conclusion that male performs better than female in science subject may not be acceptable from the fact that male over the world are usually given preferential treatment when it comes to education. She insisted that cultural stigma happens to be one of the most powerful factors that inhibit the choice of difficult courses among Nigeria girls.

In most aspect of human endeavour males see themselves, as superior to their female counterpart, when in actual sense there are some aspects that females superseded males.

Swafford cited in Bashir (2006) attempted to determine whether males and females with comparable mathematical background would have comparable achievement, attitude and problem solving skill that occurred during first year in algebra. He observed that there was no significant difference between the two groups with respect to performance in the standardize first year test. In the same vein the work of Olaganju (2001) shows that the performance of students is not dependent on their sexes.

But the work of Bassey (2003) revealed that there exist a significant gender difference in rural students' acquisition in mathematics in Cross River State, he further maintained that more co- educational institutions should be established to faster greater healthy rivalry in mathematics education.

In an attempt to investigate the influences of gender on students achievement Aiyedun (2001) revealed that there is no significant difference in the performance of the male and the female students. He noted further that the major area in which differences

are found in girls & boys performances is the area of spatial ability and usually in favor of boys. On the other hand the work Jahun and Momoh (2001) revealed that boys perform better than girls despite the fact that they are put under she same classroom situation.

Warricks et al (1995) conducted a research with students, teachers and supervisors in Pakistan. They gave the subject (students) curriculum based achievement test in mathematics, brief questionnaire to students and conducted interview with supervisors they found that students of male teacher had significantly higher achievement scores in mathematics than students of female teachers in the same grade. They went ahead to discover the effect on gender on student. And they find out that teacher's gender explained ten times more regarding students' differences in their mathematical achievement.

Gender differences in mathematics performance have been observed often (Halpern. 1992: Hyde & Linn. 1986). The pattern of gender differences is complex, however, in that it varies with the age of the student, with the type of mathematics performance that is assessed. In most studies, no significant differences have been found in the performance of boys and girls early in elementary, school, but girls begin outperforming boys in computation in Grades 5-6 at about 10 to 12 years old (Armstrong. 1980 A; Carpenter 1981: Halpern).

Fox in Ayedun (2001) opined that the greater social interest of girls may interfere with concentrated efforts that mathematics needs especially at their adolescence stage of development.

2.4 The Effect of School Location (Urban/Rural) on Students performance in Mathematics

As educational psychologist attempt to explain human behaviour as it affects learning, contrasting views among the psychologists about the variables that affects learning emerged. Some maintain that heredity is the major variable that affects learning. The developmental psychologists accept that nature may provide some ingredients, an individual can only learn what he is disposed to learn. They hold that environment where a person is brought up plays a significant rule in learning.

Bello (2006) investigated the effect of environment (urban-rural) on student's performance in Jigawa State, he arrived at a conclusion that there is a significant difference in the performance of urban students over the rural ones.

Despite the fact that environment which a child is brought up is a determining variable that effects students performance. The work of Jahun and Momoh (2001) revealed that rural-urban factor has no influence on the performance of students at J.S.S mathematics in Kwara State.

2.5 Critiques of the Review

Gender difference in mathematics education has received a substantial attention in education research. The relevance of mathematics in various careers and its positive impact on sciences and technology have generated research on how to facilitate the teaching and learning of mathematics, how to improve its method of teaching.

Despite the fact that contrasting views about the effect of gender, teaching method, and school location, emerged from the related literature reviewed in this study, it is an admitted fact that some mathematics topics require higher intellectual concentration than others. So in this line gender may

influence students' academic achievement in an aspect of mathematics that is abstract and requires higher intellectual ability. Environment also has a significant impact on students academic achievement and it is one of the determining factors that affect intellectual development of an individual. However the relevance of teaching method that inspire the learner to actively participate in teaching and learning session is imperative.

Most of the researchers conducted in the similar area of studies in the past ten to fifteen years offer solutions or partial solutions to the then existing contemporary problems. The world population in general and Nigeria in particular is increasing geometrically, the resultant effect is seen in the over population in our classes at all levels of education, rapid increase in the female enrolment in our schools.

Beside these, the current global economic meltdown which resorted into government's inability to shoulder all academic expenses, such as provision of adequate, conducive environment for learning. The above problems necessitated the need to renew research in this area so as to douse the economic tension and address the contemporary militating problems in the area under study.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1   Introduction

This study attempted to find out the effect of teaching methods (lecture method and discovery method), on the performance of secondary school students in Kano State and the relationship between gender and school location.

The chapter attempted to describe the general methodology conducted for the study. It discusses the research design, the research population and the research sample. It also highlight on the sampling techniques, sample size of the study. The instrument for gathering data, validation of the instrument, reliability of the instrument, and instrument for data analysis were also discussed in the chapter.

3.2 Research Design

Since the study attempts to investigate the effect of three factors (teaching method, gender and location) on students' academic performance in mathematics. The researcher employs a Quasi experimental design for the study. As the designs often are dependent upon the natural setting in which the researcher finds himself. Sambo (2008), opined that quasi experimental research design explore the opportunity of collecting data in situation where nature has performed or is performing her own experiment. Quasi experimental design allows the researcher to deduce the cause effect and relationship in situation over which he has very little control.

The sampled students were put into two groups i.,e. experimental and control group, four mathematics topics viz (indices and logarithm, Pythagoras theorem, Areas of a triangles and circles, and volume of a cone and cylinder) were taught to both groups, using discovery and lecture method

for experimental and controlled group respectively. After receiving instruction for the period of six (6) weeks, post test was administered on both groups. The result generated from their performances of the subject in both tests form the data for analysis in the study.

3.3 Population of the Study

The target population for this study was senior secondary schools students in Kano central senatorial zone. Senior Secondary Schools students were sampled for this study due to the fact that senior secondary mathematics starts at that level and it is assumed that at that level students have a fresh background for senior secondary mathematics. The population comprises all senior secondary school students from the five zonal education offices in Kano central senatorial zone.

Table 3.1: Students' Enrolment in Kano Central Senatorial Zone.

S/N	ZONE	MALE SCH.	ENROLMENT	FEMALE SCH	ENROLMENT
1	NASSARAWA	14	338228	17	31534
2	MUNICIPAL	10	23350	16	22652
3	DALA	9	25843	17	30539
4	KURA	18	12581	4	5704
5	DAWAKIN KUDU	19	19623	8	8991
	TOTAL	70	115225	62	109420

Source: Kano State Senior Secondary Schools Management Board Department of Planning Research and Statistics Ministry of Education Kano State.

Table 3.1 showed number of senior secondary schools with respective students' enrollment in the five zonal education offices in Kano central senatorial zone. There are 33 male schools and 50 female schools from the urban area while there are 37 male and 12 female schools in the rural area. This gave a total of 132 schools in the zone.

3.4 Sample and Sampling Techniques

A probability random sample of twenty (20) senior secondary schools comprising

of ten (10) males and ten (10) females schools from urban and rural areas were drawn from

the Kano Central Senatorial zone.

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From the sampled schools, a proportionate random sample of 356 students was drawn randomly based on Krejcie and Morgan (1970) table for determining sample size. The table below showed the sampled schools, with their enrolment, and the sampled Students.

Table 3.2: Sampled schools with student enrolment, and sample drawn.

SN	Urban Schools				Rural Schools			
	School	School Type	Enroll	Sample	School	School type	Enroll	Sample
1	GSS Airport Road	Male	390	27	SCI COLI D/Kudu	Male	123	9
2	GSS Na'ibawa	Male	404	28	GSS Kwankwaso	Male	106	7
3	GSS Gwammaja	Male	420	29	GDSS Warawa	Male	101	7
4	GSS S/Kafo	Male	394	27	GSS G/Malam	Male	130	9
5	GSS K/Nassarawa	Male	305	21	GSS Madobi	Male	129	9
6	GGC Dala	Female	337	23	GGSS Yargaya	Female	225	16
7	GGC Maikwatashi	Female	304	21	GGC Kura	Female	180	12
8	GGSS Tarauni	Female	361	21	GGC Jogana	Female	120	8
9	GGSS Gyadi-Gyadi	Female	329	23	GGSS Gezawa	Female	229	16
10	GSC K/Nassarawa	Female	407	28	GGDSS Chiromawa	Female	165	11
	TOTAL		3,651	252			1,508	104

3.5 Instrumentation

The instrument used for gathering data in this study was teacher made achievement test. Ten items essay questions were used for eliciting students' response. Essay question test was preferred over objective test due to the fact that essay question requires the original thought of candidate and it calls for the candidate to interpret, organize and solve a given problem.

3.5.1 Validation of the Instrument

The instrument for gathering data was validated with help of a colleagues, (who is a mathematics teacher). The instrument was subjected to an item analysis so as to find out its item difficulty and item discrimination index. Item difficulty measures the level of anxiety the test create among the respondents. It tells how difficult or easy a test item is.

3.5.2 Reliability of the Instrument

The reliability of the instrument was also found with help of a collogues using split half method, for the ten item questions, the score for each candidate are paired odd with even. The correlation between the paired scores for the two halves test was obtained. Spearman Brown formula was used to calculate the reliability of the full test was calculated and it was found to be 0.54.

3.6   Administration of the instrument

After validation of the instrument and obtaining the reliability of the instrument, the researcher proceeded to administer the instrument on both groups. The researcher

employs the services of colleague and administered the test to each group of students. The test was administered under a strict condition so as to measure what it intends to measure. The test was conducted in the morning hours of the day and within a short time interval (two days after intervention.) This is done to minimize the effect of history and maturation which might jeopardize the internal validity of the study. The ten item questions are answered within the time period of one hour. (1 hour).

For easy accessibility to those schools in urban areas, a private motorcycle was used, and those schools that lie on the same axis were visited on the same day. e.g. GGC Dala, Maikwatashi and K Nassarawa lie on the same axis. The same was equally applied for male schools in the urban area.

For those schools in rural areas. Schools located in the same L.G.A were visited on the same day e.g. G.G.D.S.S D/Kudu and Science College Kudu were visited on the same day.

3.7 Approach to Data Analysis

The data gathered from the performance of the sampled students was subjected to statistical analysis so as to test the hypotheses raised in the study. The statistical procedure used for the analysis of the data was the t test statistic and it was used to test all the null hypotheses at 0.05 level of significant. The test was used to test whether the difference between the mean of the two groups is significant.

CHAPTER FOUR

DATA PRESENTATION AND ANALYSIS

4.1   Introduction

This chapter dealt with results that include interpretation of findings of the study. It contains descriptive statistics about the responses of the subjects and statistical tests that were selected from inferential method and the data obtained was presented in tabular form.

4.2 Data Presentation

This section described the sample involved in the study and their percentages in both groups and within the two locations involved, that is urban and rural location.

Table 4.1: Distribution of the subjects by Gender and Location.

	Location		Total
	Urban	Rural	
Boys	132(76.3%)	41(23.79%)	173(100%)
	120(65.6%)	63(34.4%)	183(100%)
Girls			
Total	252(70.8%)	104(29.2%)	356(100%)

Table 4.1 revealed that urban schools are more populated than the rural ones with the ratio of 7:3. Also the population of urban boys outnumbers that of their rural counterpart. The same applies to the urban girls compared to their rural counterpart.

Table 4.2: Mean and Standard Deviation of the Methods Used

Methods	N	Mean	Std. Deviation
Discovery	171	50.25	13.193
Lecture	185	42.79	13.740

A look at Table 4.2 revealed that the students have found discovery method simpler to understand in consideration that they have performed better than in the lecture method. This is an indication that discovery method is more suitable in teaching and learning the concepts involved.

Table 4.3: Means and Standard Deviation Based on the Respondents' Gender

Gender	N	Mean	Std. Deviation
Females	183	47.22	11.989
Males	173	53.12	13.662

A look at table 4.3 revealed that the male students have performed better than their female counterparts. This is an indication that the male students have paid more attention and have grasped what was taught them than the females.

Table 4.4: Means and Standard Deviation Based on the Respondents School Location

Location	N	Mean	Std. Deviation
Rural	252	49.41	13.152
Urban	104	52.30	13.131

A look at Table 4.4 revealed that students from the urban schools have performed better than their rural counterparts. 1This is an indication that the urban students have paid more attention and have grasper what was taught them than the rural ones.

4.3 Hypotheses Testing

This section discussed the procedure involved in testing null hypotheses raised in the study. All the null hypotheses were tested at 0.05 level of significance. For the t test statistic, a null hypothesis would be accepted if the calculated value of t is less than the critical value of t. But if the calculated value of it is greater than the critical value of t. then such hypothesis would be rejected.

H0$_1$: There is no significant difference between the average performance of students taught using discovery and those taught using lecture method.

Table 4.5: Calculated value for t based on the methods used

Methods	N	Mean	Std. Deviation	Df	t-Cal	t-Crit
Discovery	171	50.25	13.1ᶜM			
				3 5 4	7.858	1.97
Lecture	185	42.79	15.740			

Table 4.5 showed that there was significant difference because the t-calculated has a value of 7.858 which is higher than the t-critical value of 1.97 at 0.5 level of significance. So the above hypothesis which states that there is no significant difference in the performance of students' taught using discovery method and that of students taught using lecture method was rejected. Thus, there is a significant in performance between students taught by discovery method and those taught using lecture method.

H0₂: There is no significant difference between the mathematics performance of male schools and those of the female secondary schools.

Table 4.6: Calculated value for t based on Gender

Gender	N	Mean	Std. Deviation	Df	t-Cal	t-Crit
Females	173	47.22	11.989			
				354	4.321	1.97
Males	183	53.12	13.662			

Table 4.6 shows that there was significant difference because the t- calculated has a value of 4.521 which is higher than the critical value of 1.97 at

0.5 level of significance. So, the above hypothecs which states that there is no significant difference in the performance of secondary school boys and secondary school girls in

mathematics was rejected. Thus, there is a difference in the performance of secondary school boys and secondary school girls in mathematics.

H0₃: There is no significant difference between the average performance of urban and those of the rural secondary school students

Table 4.7: The t- test Summary by Location

Location	N	Mean	Std. Deviation	Df	t-Cal	t-Crit
Urban	252	49.41	13.152			
				354	1 .986	1.97
Rural	104	52.30	13. 131			

Table 4.7 showed that there was significant difference because the t-calculated has a value of 1.986 which is higher man the critical value of 1.97 at 0.05 level of significance. So the above hypothesis which states that there is no significant difference in the performance of urban and rural secondary schools students in mathematics was rejected. Thus there is a significant difference between the performance of urban and those of rural secondary schools students in mathematics.

4.4 Discussion

As stated earlier, this work sought to investigate effect of teaching method, gender, and the school location on the mathematics performance of secondary school students in Kano State. Three null hypothesis were formulated and tested at 0.05 level of significance, the result emerged from the study revealed that discovery method is more effective than the lecture method, This is arrived at as a results of rejection of null hypothesis (Ho_1) which stated that there is no significance differences between the average performance of students taught using discovery method and those taught using lecture method. Emergence of this result might not be unconnected with the fact that the more one participate in discovering the solution to his problem, the more the tendency he understands it better. This finding however, agrees with the work Galadima (2002), Kajuru (2007) and Riasat (2010), but disagree with the findings of Ebele (2008).

Analysis of hypothesis II which stated that there is no significant difference between the mathematics performance of males and those of female in secondary schools, revealed that males performance significantly better than their females counter part., This result is in harmony with the work of Mercy (2007), Aminu (2008) Waricts (1995) and Bassey (2003) but contradicted the finding of Jahun and Momoh (2001), Bashir (2006), Halpen (1992) and Hyde (1986).

The result obtained from analysis of the hypothesis III, which stated that $H0_3$: There is no significant difference between the average performance of urban and those of the rural secondary school students, revealed that students from urban area perform significantly better than their rural counter part. Emergence of this result may be attributed to the fact that positive inpact of western education is more felt and seen in

the urban areas than the rural areas. It is therefore more valued in the urban community than the rural community. This result however aligned with the work of Bello (2006) but disagree with the work of Jahun and Momoh (2001).

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Introduction

This study attempted to determine whether gender and school location have any effect on learning mathematics among secondary school students, it also sought to determine the impact of teaching methods (Discovery and lecture methods) on students' performance in mathematics

Pretest and post test were used to collect the data for the study. A t test statistic was used to analyze the data and consequently test the null hypotheses raised in the study.   Summary of the result obtained, conclusions and recommendations were discussed in this chapter.

5.2 Summary of Major Findings

A quasi experimental design was used for this study   with view   to finding out the effect of teaching method, gender and school location on the performance of secondary school students in mathematics.

Three null hypotheses were formulated:

$H0_1$: There is no significant difference between the average performance of students taught using discovery and those taught using lecture method.

Analysis of the obtain data (using t-test) revealed that .significant difference emerged among the students in favour of those taught using discovery method. This is to say students that received instructions using discovery method performed better than those taught using lecture method. Therefore the null hypothesis raised above was rejected at 0.05 level of significance.

H0$_2$: There is no significant difference between the mathematics performance of male schools and those of the female secondary schools.

The result of the analyzed data showed that there existed a significant difference between the performances of males over female students. This resulted into rejection of the above null hypothesis and the alternative hypothesis is accepted.

H0$_3$: There is no significant difference between the average performance of urban and those of the rural secondary school students.

Analysis of the result obtained showed that urban students performed better than the rural students.

5.3 Conclusion

This study sought to find out whether teaching methods, gender and school location have any effect on learning mathematics among secondary school Student. The result obtained from the analysis of the data obtained in this study led to the rejection of' all the three null hypotheses raised in the study. Hence answer to the research question goes:

- ✓ Discovery method proved to be more effective than the lecture method.
- ✓ Gender has significant effect in learning mathematics in favour of males.
    - ✓ School location also affected students" performance in mathematics i.e. urban students' perform better than their rural counterparts.

5.4 Recommendations

Based on the results generated from this study, the following recommendations were put forward.

1. Government at all levels (federal, state, local) should within the available resource encourage and mobilize teachers to adopt using discovery method in teaching mathematics so as to avoid the mystification of the subject caused by using lecture method in teaching

2. Teachers in secondary school should not be authoritarian in a classroom, but allow students a freedom to satisfy their own curiosity to some extent so that they can be guided to discover the source and solution to their own problems.

3. Government should ensure adequate provision and maintenance of teaching/learning facilities mostly in rural area lacking laboratories and workshops and where there exist such laboratories they are just mere structure with no modern apparatus.

4. Government should embark on revolutionary campaign for female education so as to reverse the lopsided females to male enrolment ratio figure in our secondary schools. This will boost the morale for females towards acquisition of western education in general and mathematics in particular.

    More so, government, non governmental organization (NGO) religious leaders should mobilize public toward fighting against this trend. This will help in empowering females toward appropriate role expectation from them.

5.5 Suggestion for further studies

As the study is narrowed to only secondary school students and confined to only

four mathematics topics, further studies that will cover a wider scope is hereby suggested so as to address problems or answer questions not raised in this study.

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Appendix 1

Pre-Test Question

Instructions: Answer all questions

1. Express the following as the product of their prime factors, leave your answer in index

form:

a) 8

b)27

2. Evaluate the following:

i) $\log_a a$ (ii) $\log_a a^3$

3. Calculate the radius of a circle whose circumference is 8cm.

4. An isosceles right-angled triangle has two-sides 10 cm each. Find the hypotenuse.

5. The area of a triangle is 42cm^2 if its base is 6cm, find the height of the triangle.

6. Evaluate:

a) $(\sqrt[3]{27})^2$

b) $(64)^{1/2}$

7. Calculate the area of a circle with radius 3.5cm

8. Find the volume of a cone with radius 3cm and height 7cm.

9. A cone and a cylinder have equal radius and height If the volume of a cone is 30 cubic

unit, find the volume of the cylinder.

10. Simplify $\log_{10} 4 + \log_{10} 25$

Appendix 2

Pre-Test Marking Scheme

Each question carries 10 marks

1. a) $8 = 2 \times 2 \times 2 = 2^3$ (M_2 B_2 Ai)

b) $27 = 3 \times 3 \times 3 = 3^3$ (M_2 B_2 Ai)

2. Evaluate

a) $\log_a{}^a = \log_a{}^{a3} = 1 \ \log_a{}^a = 1$.   (M_2 B_2 Ai)

b) $\log_a{}^{a3} = \log_a{}^a = 3 \ \log_a{}^a$ but $\log^a = 1$ (M_2 B_2 Ai)

$3 \log_a{}^a = 3$

3. Circumference of a circle $= 2\pi\text{-} = 88$

$r = 88/2\pi = \dfrac{88 \times 7}{2 \ x \ 22}$

$= 14\text{cm}$

                                          (M_4 B_4 A_2)

4.

10

10
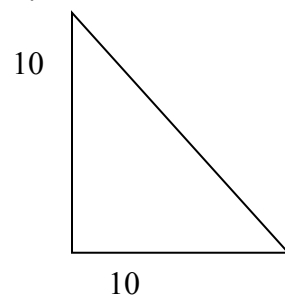
Applying Pythagoras 'theorem

$10^2 + 10^2 = h^2$

10   or $h^2 = 100 + 100 = 200$

$^\wedge = \sqrt{200} = 14.1\text{cm-}$ ($M4B_4A_2$)

5. Area$= l/2(\text{b} \times \text{h}) = 1/2\text{bh}$

Area $= 42\text{cm}^2$

base = 6cm,

height = ?

$42cm^2 = 1/2$ x6xh

h = $\underline{2x42}$ $\underline{84}$ = 14
    6   6

$(M_4B_4A_2)$

6. Evaluate:

(a) $(3\sqrt{27})^2 = (3)^2 =$

      $(3\sqrt{27})^2 = (3)^2 = 9$ (M_2B_2Ai)

(b) $(64)^{1/2} = \sqrt{64} = 8$ $(M_2 B_2 Ai)$

7. Area = πr^2

=22/7x 3.5x3.5 =(22 x 3.5 x 3.5)/7 = $38.5cm^3$ $(M_4 B_4 A_2)$

8. Volume of a cone $1/3(\pi r^2 h)$

v =1/3 x 22/7 x $(3)^2$ x 7

= 1/3 x = 22/7 x 9 x 7

=22x3=66cm3 $(M_4 B_4 A_2)$

9. Volume of a cone =1/3 time volume of a cylinder

Or volume of a cylinder = 3 x volume of a cone (B_4)

Volume of a cylinder = 3 x 30 = 90 cubic unit (A_2)

10. Simplify $Iog_{io}4 + Iog_{io}25 = logi._{10}(4 \times 25) = log,_0 100$

=$log_{1o}10^2 = 21 log_{1o} 10 = 2$ $(M_4 B_4 A_2)$

Appendix 3

Mathematics Post-test.

Instructions: Answer all questions.

(l)Simplify the following

(i) $(x^3) \times (x^4)$

(ii) $(x^5 \times X^2) \div X^7$

(2)   simplify the following

(i) $3\sqrt{y^2} \times y^{1/3}$

(ii) $y^5 \div y^5$

(3)Evaluate the following.

(a) $\log_{l10} 1000$

(b) $\log_2 32$

(4) Find the missing side in the figure below.
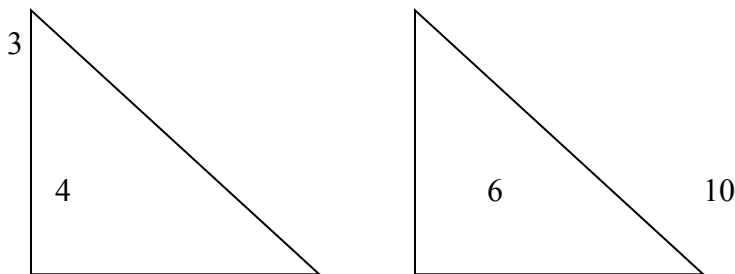
5. A ladder 13m long leans against a vertical wall so that its foot is 5m away from the wall. How high up the wall did the ladder reaches.

6. Find the radius of a circle whose area is 154cm^2

7. Calculate the area of a right angled triangle with sides 6,8,10 units.

8. A cone and a cylinder have the same radius and height if the volume of the cylinder is 312cm^3. Find the volume of the cone.

9. Find the volume of a cone of radius 3cm and height 8cm.

10. A cylinder has a volume of 1232cm^3. If its radius is 7cm. find its height.

Appendix 4

Post-test Marking Scheme

Each question carries 10 marks

i. $x^3 \times x^4$ method 2marks

applying law of indices

$X^3 \times X^4 = X^{3+4} = X^7$ step 2marks

ii. law of indices. $X^{5+2} \div X^7 = X^{7-7} = X^\circ = 1$ answer 1 mark

                                                              method 2 marks

                                                              step 2 marks

                                                              answer 1 mark

2. Simplify

$3\sqrt{y^2} \times y^{1/3}$ method 2 marks

$= Y^{2/3} {}_x y^{1/9}$ step 2 marks

$= Y^{7/9}$ answer 1 mark

ii. $Y^5 \div Y^5 = Y^{5-5} = Y^0 = 1$

                                                              method 2marks

                                                              step 2marks

                                                              answer 1 mark

3. Evaluate

i. $\log_{10} 1000 = \log_{10} 10^3 = 3\log_{10} 10 = 3 \log_{10} = 3 (1) = 3$ method 2marks

                                                              step 2marks

ii. $\log_2 32 = \log_2 2^5 = 5 \log_2 2 \ ^A = 5 \ (1\ ) = 5$ method 2marks

step 2marks

answer 1 mark

4. Applying Pythagoras Theorem

$X^2 = 3^2 + 4^2 = 9 + 16$ method 2 marks

$= 9 + 16$ step 2 marks

$= 25$ answer 1 mark

$X = \sqrt{25} = 5$

ii.   Applying Pythagoras theorem

$10^2 = 6^2 + X^2$ method 2 marks

$100 - 36 = X^2$ step 2 marks

$X^2 = 64$ answer 1 mark

$X = \sqrt{64}$

$X = 8$

5. Applying Pythagoras' theorem
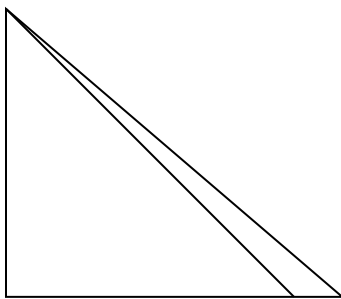
Diagram 2 marks

Step 4 marks

Answer 4 marks

$13^2 = 5^2 + x^2$

$X^2 = 13^2 - 5^2$

43

$X^2 = 169 - 25 = 144$

$X = \sqrt{144} = 12$

6. Area of a circle is

$4rea = \pi r^2 = 754\ 22/ = -/54cm\ 7$ method 4 marks

$r^2 = \dfrac{154 \times 7}{22} = \dfrac{77 \times 7}{11} =$ step 4 marks
                             answer 2 marks

$r^2 = 49$
$r^2 = \sqrt{49} = 7$

7. Area of a triangle = 1/2 base x height $= 1/2 \times 8 \times 6 = 1/2 \times 48 = 24cm^2$

                            method 4mark

                            step 4 marks

                            answer 2 marks

8. Volume of a cone is one third of volume of a cylinder $V = l/3 \times (312) = 104cm^3$

9. Volume of a cone $= 1/3\ \pi r^2\ h$

                            method 4mark s

                            step 4 marks

                            answer 2 mark

$= 1/3 \times 22/7 \times 3^2 \times 8 = 75.42cm^3$

$= 75.42cm^3$

10. Volume of cylinder $= \pi r^2 h = 1232$

$\dfrac{22 \times 7^2 \times h}{7} = 1232$ method 4 marks
                            step 4 marks

$h = \dfrac{1232}{154} = 8cm$ answer 2 marks
                        44

Lesson plan I: for Discovery Method.

School   G S S

Class: SSI

Subject: Mathematics

Topic: Area of a triangle.

Instructional materials: Geo-board, Rubber band and string

Objective: At the end of the lesson, students should be able to find the area of a given triangle, they should also find the area of a given triangle.

Previous knowledge: Students were already familiar with area of a rectangle

Introduction: The lesson would be introduced to the students by asking them some questions on the previous knowledge

Presentation: The lesson will be presented to students in the following sequential steps

Step 1: Demonstration on how to form a triangle from a geo-board using a string would be done before the students.

Step II: Area of the triangle formed would be found by counting, the small squares enclosed by the string would be explained to the students.

Step III Formula for computing area of a triangle would be given and explained to the students

Step IV: Students will be called out in turn to form a triangle of given dimension on the geo-board and compute its area.

Conclusion: The whole lesson would be summarised on the board for the students.

Lesson Plan II: for Discovery Method

School   G S S

Class: S S I

Subject: Mathematics

Topic: Volume of a cone and cylinder

Instructional materials; Improvised cones and cylinders of the same diameter made from a cardboard paper, and a sand.

Objective: At the end of the lesson, students should he able to find the area of a cone and cylinder and explore the relation between them.

Previous knowledge: Students are familiar with volume of a cubes and cuboids.

Introduction: The lesson would be introduced to the students by asking them some questions about the previous knowledge. e.g. Find the volume of a cube with side 6cm.

Presentation: The lesson would be presented to the students in the following sequential steps:

Step I: A cone and a cylinder having equal radii and equal heights were shown to the students. A cone filled with sand was emptied into a cylinder of the same radius and height. It was observed that 3 times volume of a cone fill the cylinder.

Step II: Experiment on the relationship between cone and cylinder follows i.e. 3 x volume of a cone = volume of a cylinder or volume of a cone is one third of the Volume of a cylinder havig the same radii and heights.

Step III: More problems would be solved on volume of a cone and a cylinder.

Step IV: Class work would be given to the students

Conclusion: take home assignment on construction of a cone and cylinder would be given to the students

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Appendix **7**

Lesson Plan III: for Discovery Method

School   G S S

Class: SSI

Subject: Mathematics

Topic: Pythagoras theorem

Instructional materials: Gee-board, looped rubber band and string.

Objective: At the end of the lesson, students should be able to apply Pythagoras theorem, to solve a related problem.

Previous knowledge- Students have already known perfect squares, types of triangles and their properties

Introduction: The lesson would be introduced to the students by asking them some questions on their previous knowledge.

Step I: A triangle with Pythagorean triple will be formed on a goo-board e.g. 3,4, 5 units.

The number of small squares on the hypotenuse will be counted and compared to the number of small squares on the other two sides.

Step II: Pythagoras theorem would be verified and explained to the students.

Step III: More problems would be solved to the students e.g. find the hypotenuse of a right angled triangle whose other sides are 5cm each.

Step IV: Students would be called out to solve problems on the board.

Conclusion: The whole lesson would be summarised on the board for the students

Appendix **8**

Lesson Plan III: for Discovery Method

School   **G S S**

Class - SSI

Subject - Mathematics

Topic - Area of triangle

Objective; At the end of the lesson, students should also able to find the area of a given triangle. They should also use a formular to find the area of triangle.

Previous Knowledge: Students have already know how to find the area of a rectangle and square.

Introduction: The lesson would be introduced to the students by asking them some questions on their previous knowledge, e.g. what is the area of a square with side 5cm?

Presentation: The lesson would be presented in the following sequential steps.

Step I: Relation between rectangle and triangle would be explained to the students, i.e. triangle can be formed when a rectangle is bisected along either of the diagonals.

Step II: Area of a triangle is equal to the half of the area of a rectangle, i.e. Area= base x height

Step III: How to find the area of a rectangle would be explained to the student

Step IV: Students would be called out to solve problems on the board

1. Calculate area of triangle whose base is 7cm and height of 10cm

2. Calculate area of right triangle with side 6, 8 and 10cm

Conclusion: The whole lesson would be summarized on the board for the students.

Evaluation: Class work would be given to the student.

Appendix 9

Lesson Plan I: for Lecture Method

Class SS1

Subject : Mathematics

Topic Indices

Duration 40mins.

Age 16 years

Objectives At the end of the lesson, students should solve problems on indices; they should also be able to apply laws of indices to solve related problems.

Previous Knowledge: Students are already familiar with multiplication, division and expressing number as product of its prime factors.

Introduction: The lesson would be introduced to the students by asking them some questions about their previous knowledge, e.g. express 8 as a product of its prime factors.

Presentation: The lesson would be presented in the following sequential steps:

Step 1: Meaning of indices would be explained to the students i.e. 8= 2x 2x2 or 8=2^3 indices form.

Step II: Meaning of base and power would be explained to the students.

Step III: Laws of indices would be explained to the students i.e. $a^n \times a^n = a^{m+n}$

$a^n \div a^m = a^{n-m}$. $a^0 = 1$ for all $a \neq 0$

Step IV: Problems would be solved on the board e.g. simplify (i) $a^2 \times a^3$ (ii) $a^3 \div a^2$

Evaluation: The lesson would be evaluated by giving the students class work.

(i)   Evaluate $2^3 \div 2^2$

(ii) $2^2 \div 2^3$

Appendix 10

Lesson Plan II: for Lecture Method

School   G S S

Class   SS 1 Subject- Mathematics

Topic   Volume of a Cone

Duration -   40 mins.

Age   1 6 years

Objectives: At the end of the lesson, students should he able to find the volume of a cone with given dimensions. They should be able to relate volume of a cone to that of cylinder with the same base and height.

Previous Knowledge: The students have already known how to find the volume of a cylinder.

Introduction: The- lesson would be introduced to the students by asking them some questions on their previous knowledge.

Presentation: The lesson would be presented to the students in the following sequential steps:

Step I: Explanation of how a cone is curbed from a cylinder would be given to the students.

Step II: formula for volume of a cone would be given to the students, i.e. vol = $1/3\pi r^2 h$.

Step III: Problems would be solved for the students on finding the volume of a cone e.g. find the volume of a cone of radius 7cm and height 12cm.

Step IV: Relationship between volume of a cone and volume of a cylinder would be explained to the students i.e. volume of cylinder = 3 x volume of a cone with the same base and height.

Conclusion: The whole lesson will be summarised to the students

Appendix 11

Lesson Plan III: for Lecture Method

School G S S

Class: SS 1

Subject Mathematics

Topic Volume of a Cone &. Cylinder

Duration 40 mins.

Age 16years

Objectives At the end of the lesson, students should be able to calculate volume of a cone and that of a cylinder.

Previous Knowledge: The students have already know how to find the volume of a cubes and cuboids.

Introduction: The lesson would be introduced to the students by asking them some questions on their previous know ledge.

Presentation: The lesson would be presented to the students in the following sequential steps:

Step 1: The meaning of volume of a cylinder would be explained to the students, i.e. volume = area of a circular base x the height of the cylinder.

Step 11: Formula for computing a volume i.e. $\pi r^2 h$ would be explained to the students.

Step III: Examples 'with solutions would follow i.e. (i)

Find the volume of a cylinder with base radius of 5cm and height of 4cm. Volume= $\pi r^2 h$

22/7 x 5x5x14= 1100cm^2.

Step IV: Class work would be given to the students, e.g. find the volume of cylinder whose radius 7cm and base 14cm.

Conclusion: The whole lesson will be summarised for the students.

Appendix 12

Lesson Plan III: for Lecture Method

School   GSS

Class   SS1

Subject -   Mathematics

Topic - Area of a Circle

Duration -   40 mins.

Age -   16 years

Objectives: At the end of the lesson, students should be able to calculate the area of a circle. They should also be able to find the radius of a circle with given area.

Previous Knowledge: Students have already known how to find the circumference of a circle with a given radius.

Introduction: The lesson would be introduced to the students by asking them some questions on their previous knowledge, e.g. find the circumference of a circle with radius 7cm.

Presentation: The lesson would be presented in the following sequential steps:

Step 1: Meaning of area would be explained to the students, i.e. the empty space enclosed by the circumference of the circle.

Step II: Formula for finding the area would be written and explained to the students, i.e. Area= πr^2.

Step III: Problems would be solved using urea to the students e.g. find the area of a circle with radius 3.5cm.

Conclusion:

Area = i.e. πr^2 = (22/7) x 3.5 x 3.5 =(269.7)/7 = 38.cm^2

Step IV: Class work would be given to the students

Calculate the radius of a circle with area 154cm^2.

The lesson would be concluded by summarising the whole lesson to the students.

Lesson Plan IV: for Lecture Method

School G S S

Class SS 1

Subject - Mathematics

Topic Pythagoras' theorem

Duration - 40 mins

Age 16 years

Objectives: At the end of the lesson, students should apply Pythagoras' to solve a related problem.

Previous Knowledge: Students have already known perfect squares, types of triangle and right angled triangle.

Introduction: The lesson would be introduced to the students by questioning them some on the previous knowledge.

Presentation: The lesson would .be presented in the allowing sequential steps:

Step 1: Explanation of Pythagoras theorem would be given to the students.

Step II: Problem would be solved on the Pythagoras theorem to the students,

Step 111: Class work would be given to the students example: find the hypotenuse of an isosceles right angled triangle with equal sides 5cm example find the missing side of the triangle below:
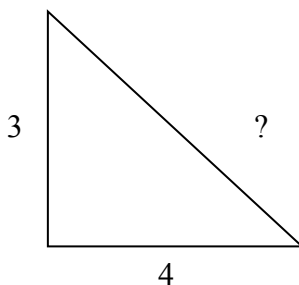
Conclusion

The lesson would be concluded by summarising the whole lesson in the class.

Appendix 14

Lesson Plan V: for Lecture Method

School   G S S

 Class   SS 1

Subject - Mathematics   ' .

Topic   Logarithm

 Duration - 40mins.   **Age**   I 6 years

Objectives: At the end of the lesson, students should understand what logarithm to a given base means. They should also solve some problems on logarithm.

 Previous Knowledge: Students have already known how to add, multiply and divide real numbers.

 Introduction: The lesson would be introduced to the students by asking them some questions on their previous knowledge, e.g. simplify the following (i) 3. 5x7 (ii)4.2 ÷ 0.7

Presentation: I he lesson would be presented in the following sequential steps:

Step I: Meaning of logarithm to a given base would be explained to the students, i.e. Logarithm of x to base y is the number to which y must be raised to get x i.e. log, x or $\log_2 8 = 3$ because $2^3 = 8$.

I.og$_{10}$ 10=1 because10^1=10

Step II: More problems would be solved students e.g. evaluate: (i) Iog$_5$25

(ii)   log$_3$27   (iii) log$_4$64.

Step III: More work would be given to the students: evaluate the following

(i) log25   (ii) log; 27 log64

 Evaluation: The whole lesson would be summarised on the board for the students.

Appendix 15

PRE-TEST RAW SCORES OF STUDENTS PERFORMANCE

S/N	Urban		Rural	
	Male	Female	Male	Female
1	40	40	40	50
2	45	50	60	50
3	45	65	35	40
4	20	40	55	25
5	25	40	45	60
6	30	45	50	45
7	60	70	25	25
8	50	50	60	35
9	70	25	40	40
10	65	30	30	40
11	63	50	45	35
12	45	45	40	60
13	30	40	40	25
14	45	50	60	40
15	46	40	45	45
16	25	40	55	45
17	45	40	35	40
18	40	25	45	25
19	50	45	45	40
20	50	50	45	30
21	55	40	55	30
22	60	55	40	40
23	65	50	40	50
24	60	40	50	50
25	45	60	50	65
26	55	40	50	55
27	50	35	70	35
28	20	250	45	55
29	25	30	45	55
30	35	40	55	45
31	45	50	30	40
32	40	55	35	40
33	45	25	40	45
34	40	70	40	40
35	55	40	40	50
36	45	45	25	55
37	55	5	35	45
38	50	55	45	40
39	55	40	40	25
40	40	45	50	35
41	45	40	45	50
42	50	50		50
43	50	55		45
44	55	20		45

S/N	Urban		Rural	
	Male	Female	Male	Female
45	40	30		40
46	70	40		70
47	60	30		55
48	25	20		25
49	35	60		25
50	40	40		45
51	45	30		20
52	50	20		60
53	55	40		25
54	75	45		50
55	65	50		35
56	55	40		55
57	60	35		50
58	50	45		70
59	45	25		50
60	50	40		60
61	50	60		20
62	45	65		40
63	40	70		55
64	40	25		
65	45	40		
66	50	40		
67	55	25		
68	60	30		
69	65	40		
70	50	40		
71	30	40		
72	35	50		
73	35	35		
74	30	30		
75	45	40		
76	40	60		
77	55	55		
78	55	45		
79	60	40		
80	45	40		
81	50	40		
82	60	25		
83	40	20		
84	45	35		
85	50	40		
86	50	55		
87	30	20		
88	50	45		
89	45	50		
90	60	55		

S/N	Urban		Rural	
	Male	Female	Male	Female
91	20	60		
92	15	45		
93	25	40		
94	20	30		
95	45	40		
96	25	35		
97	45	60		
98	40	45		
99	45	55		
100	35	25		
101	50	50		
102	30	25		
103	25	40		
104	60	35		
105	50	40		
106	40	25		
107	40	40		
108	35	60		
109	25	45		
110	40	20		
111	50	40		
112	25	40		
113	70	25		
114	40	30		
115	35	50		
116	30	35		
117	40	25		
118	40	35		
119	25	40		
120	45	50		
121	50			
122	40			
123	45			
124	50			
125	45			
126	60			
127	25			
128	20			
129	30			
130	40			
131	50			
132	45			

Appendix 16

POST-TEST SCORES OF STUDENTS TAUGHT USING DISCOVERY METHOD

S/N	Urban		Rural	
	Male	Female	Male	Female
1	65	50	60	40
2	60	60	40	50
3	50	50	40	60
4	40	60	40	40
5	45	40	45	50
6	40	45	50	35
7	55	30	45	40
8	60	45	30	50
9	60	40	35	70
10	45	50	40	50
11	50	50	50	50
12	50	50	60	50
13	55	55	70	65
14	60	55	70	55
15	45	40	40	65
16	30	60	55	30
17	70	70	60	40
18	65	60	50	50
19	70	65	50	30
20	45	25	50	45
21	40	30	70	60
22	40	40	50	40
23	45	50	60	55
24	60	50	40	40
25	65	60		50
26	50	40		40
27	60	40		45
28	60	50		60
29	65	40		
30	60	50		
31	25	30		

S/N	Urban		Rural	
	Male	Female	Male	Female
32	45	55		
33	60	55		
34	45	40		
35	50	50		
36	60	30		
37	60	60		
38	55	65		
39	55	60		
40	40	45		
41	50	40		
42	50	55		
43	60	50		
44	45	50		
45	55	40		
46	60	50		
47	65	45		
48	70	50		
49	70	45		
50	50	70		
51	50	60		
52	40	60		
53	55	70		
54	60	35		
55	65	45		\
56	60	50		
57	60	60		
58	55	40		
59	50			
60	70			
61	50			

Appendix 17

POST-TEST SCORES OF STUDENTS TAUGHT USING LECTURE METHOD

S/N	Urban		Rural	
	Male	Female	Male	Female
1	40	50	30	25
2	60	4	50	40
3	40	30	40	40
4	50	45	30	40
5	45	55	30	50
6	55	50	40	45
7	55	55	60	45
8	40	25	60	60
9	30	40	50	25
10	35	50	45	30
11	25	20	60	40
12	60	50	50	45
13	65	50	40	50
14	40	20	40	60
15	55	40	30	70
16	40	40	50	40
17	40	30	60	40
18	40	40	45	45
19	45	40	40	50
20	40	50	45	40
21	45	60	40	60
22	50	45	45	50
23	40	50	50	40
24	40	45	45	20
25	50	60	50	50
26	60	60	60	35
27	60	50		50
28	35	45		45
29	30	50		
30	40	45		
31	40	40		
32	40	45		
33	45	40		
34	40	30		
35	40	45		
36	40	40		
37	45	50		
38	50	45		
39	40	60		
40	50	40		
41	20	40		
42	50	20		

43	40	40		
44	40	40		
45	40	20		
46	40	60		
47	45	70		
48	40	40		
49	35	40		
50	30	70		
51	35	50		
52	40	40		
53	50	50		
54	60	30		
55	60	40		
56	40	50		
57	30	30		
58	50	50		
59	20	50		
60	40	60		
61	60	50		
62	50	40		
63		40		
64		30		
65		40		
66		50		
67		60		
68		40		
69		50		