

**EFFECTS OF COMPUTER BASED-INSTRUCTION ON RETENTION AND
PERFORMANCE IN ALGEBRAIC WORD PROBLEMS AMONG JUNIOR
SECONDARY SCHOOL STUDENTS IN KADUNA STATE, NIGERIA**

BY

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FEBRUARY, 2017

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**Being a Dissertation Submitted to the School of Post Graduate Studies Ahmadu Bello
University Zaria in Partial Fulfilment for the Award of Master Degree in
Mathematics Education, Department of Science Education, Faculty of Education,
Ahmadu Bello University, Zaria Nigeria**

FEBRUARY, 2017

DECLARATION

I Istifanus AYUBA (M.Ed/Educ/5407/11-12) hereby declare that this dissertation titled “Effects of Computer- Based Instruction on Retention and Performance in Algebraic Word Problem Among Junior secondary School Students in Kaduna State, Nigeria” is a product of my research work and is original. Other authors whose works were used in this thesis have been duly acknowledged.

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CERTIFICATION

This dissertation titled “Effects of Computer-Based Instruction on Retention and Performance in Algebraic Word Problem Among Junior Secondary School Students in Kaduna State, Nigeria” meets the requirement for the award of degree of Masters in Mathematics Education of Ahmadu Bello University and is approved for its contribution to knowledge and Literacy.

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DEDICATION

This research work is dedicated to my wife Jessica Istifanus and sons Miracle and Aaron Istifanus for their patience and understanding during the course work.

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ABBREVIATIONS

AWP:	Algebraic Word Problem
AWPPT:	Algebraic Word Problem Performance Test
AWPRT:	Algebraic Word Problem Retention Test
CBI:	Computer Based Instruction
CLM:	Conventional Lecture Method

OPERATIONAL DEFINITIONS OF TERMS

Academic Performance: Reaching a particular goal or standard after an instruction

Computer Based Instruction: Application of computer software package to teach mathematics

Conventional Lecture Method: This is a method of teaching whereby the teacher dominates classroom activities. It is teacher centered.

Retention: The ability of a learner to recall knowledge after receiving instruction

ABSTRACT

This study examined the Effects of Computer – Based Instruction on Retention and Performance in Algebraic Word Problems among Junior Secondary School Students in Kaduna State, Nigeria. The study was guided by four research questions and four hypotheses. The quasi experimental research design involving two groups (one experimental and the other control) was used. The population of the study comprised of junior secondary school two (JSS2) students of the public secondary schools in Kafanchan Educational Zone of Kaduna State. Two (2) coeducational schools were selected by the simple random sampling method as school for the research. Two intact classes were selected using the simple random sampling from the JSS2 arm from which 98 students participated as sample for the study (53 male and 45 female). Two instruments: Algebraic Word Problems Performance Test (AWPPT) and Algebraic Word Problems Retention Test (AWPRT) were used for data collection. The research hypotheses were analyzed using the t-test at $P \leq 0.05$ level of significant by the aid of the computer software Statistical Packages for Social Sciences (SPSS version 21). The results obtained showed a significant difference in performance in favour of student exposed to the Computer Based Instruction (CBI). The results also revealed no significant difference in performance of male and female students when exposed to CBI. The result further revealed that the students exposed to CBI had better retention compared to their counterpart who were taught by the lecture method. However, the difference in retention of male and female students exposed to CBI was not significant. The study concludes that the CBI is effective in the teaching and learning of algebraic word problems in junior secondary schools and it is a gender friendly teaching method. Based on the findings the following recommendations were made: teachers should employ the CBI in the teaching of algebraic word problems in junior secondary schools to enhance students' performance. Workshops and seminars for mathematics teachers should be organized by the Ministry of Education for each educational zone in Kaduna State on the use of CBI.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

With the pace of time development in the society, frequent changes have been made in the pattern of education from time to time to meet the needs of society. The remarkable progress of science and technology and the economy have not been only causing great changes in every aspect of society but also bringing crucial changes in education (Anderson, 2007). Education is considered to be the most powerful tool for all-round development of the human beings. As such, the enlightened nations have to assign to priority to education system.

The utility of Mathematics made it an inevitable course of school life all over the world. But what a great misfortune with such a significant subject that the majority of school going population is afraid of it (Susan, 2006). This dread of Mathematics is due to callous and weak approach of teaching mathematics. Students who are bright and shining in almost all other subjects of their study should not be blame for this discrepancy. Mathematics taught at secondary level is not compatible with the needs of students and in line with the prevailing boom of technology in Nigeria Sulman (2006). Although the textbooks elaborates the concepts logically, comprised of numbers of solved examples, illustrations and exercises, the situation of teaching of mathematics in typical schools of Nigeria is that there is no room for participation, intellectual development, expositions of incorporating derivation, and theorem-proving exercises in which students verify mathematical facts in a symbolic computation environment. Learning mathematics include solving various types of problems, from those which require performing arithmetical

operations to those which require problem solving skills. Students are faced with mathematical word problems consisting of both word and numbers as early as the pre-school age and also later in school age. Effective performance and retention of algebraic word problems requires affective approach (Anderson, 2007).

Mathematics which has been aptly described by many individuals as the queen and servant of all subjects has been of great importance to mankind very many years ago. In contrast to other disciplines, the knowledge of mathematics has a boundless limit in terms of application and usage. In fact one would regard mathematics as a basic tool in realizing global aspiration in the areas of science and technology. Azuka, and Harbour, (2000) all stressed the importance of Mathematics. They maintained that Mathematics is the foundation of science, and science as the bedrock of modern development is the foundation of technology. Hence for any nation to achieve meaningful technological development there must be effective teaching and learning of Mathematics in the school system.

Von Neuman, (2008) described Mathematics as the language of nature which can satisfy a wide range of interests and abilities. It develops the imagination, and trains individual in a clear and logical thought. It is a challenge with a variety of difficult ideas and unsolved problems, because it deals with questions arising from complicated structures. Today more than ever before, all fields of knowledge are depending on mathematics for solving problems, stating theories and predicting outcomes. It is an indispensable tool in creating new knowledge. Nigeria like any other developing nation is making a swift move towards technological development. However, any loud able achievement in technological development will be hampered if the potential Scientists, engineers and technologists are not fully equipped with sound knowledge of Mathematics.

Daves, ((2006) was of the view that new technologies have the potential to support education across the curriculum and provide opportunities for effective communication between teachers and students in ways that have not been possible before. Several studies argued that the use of new technologies in the classroom is essential for providing opportunities for students to learn and operate in an information age.

It is evident, as Yelland, (2001) argued, that traditional educational environments do not seem to be suitable for preparing learners to function or be productive in the workplaces of today's society. She claims that organizations that do not incorporate the use of new technologies in schools cannot be seriously claimed to prepare their students for life in twenty-first century. Due to the importance of computer in our classrooms and the entire school system, the possible obstacle to the integration of these technologies in schools would be an important step in improving the quality of teaching and learning. However, current research would suggest that the use of computer will necessarily transform science education.

The improvements in the capabilities of computers and advances in telecommunication technology tools that have important implications for education in mathematics and technology. The ever-increasing sophistication in computing and telecommunications technologist has led to questions that challenge the spatial and temporal boundaries (Jonassen, 2005). Information and communication technology (ICT) now offers the possibility for learning and teaching to take place in new settings and to inspire and facilitate lifelong education.

The Information and Communication Technology (ICT) has become the basis of any other technology, mode of delivery communication and interaction. According to UNESCO

(2002), information and communication technology is defined as the combination of informatics technology (technological applications of informatics in society) with other related technologies, specifically communication technology. Therefore, making use of computer, internet, websites, e-mails chatting, online programs and educational software comes under Information and Communication Technology (ICT). Information and Communication Technology (ICT) enables students to work at their own pace with continuous assessment, in contrast to the traditional teaching methods which can be described as batch-processing with episode assessment. Continuous assessment allows teachers to pinpoint the areas where students falter- and in case of some multi-media programs, those areas trigger further practice automatically so that students receive more instructions “just in time” when they need it most (Massy & Zamsky, 2006).

It will be therefore quite imperative to look for a computer related teaching approach which could make the teaching of mathematics more useful, interesting and meaningful. Hence Algebraic Word problems should be taught with a computer related teaching approach.

1.2 Statement of the problem

In Kaduna state, the persistent poor performance of secondary school students in Junior Secondary School Certificate Examination (JSSCE) in Mathematics has been a major concern for parents and science educators. Every year government is spending huge amount of money in funding education but to no avail. Parents are persistently crying for the falling standard of education especially in Mathematics, the solution to which is eluding us every day. Aremu, (2005) reported that academic failure is not only frustrating to the students and the parents, its effects are equally grave on the society in terms of death of manpower in all spheres of the economy and the politics.

Teachers, at all academic levels are faced with the task of making the education experience meaningful to students. For many educators there is a continuous struggle associated with making choices related to both content and method of teaching. Jonens, Wilson and Bhaswani (2007) stated that even though students fail in Mathematics, but the reasons for that could be linked to curriculum and methods of teaching rather than the student's lack of capacity to learn. The selection of teaching technique is not an easy task at best, since there is no single method that seems to work well for everyone. Every teacher must identify appropriate methodology based on the nature of the subject matter to be covered, the anticipated effectiveness with a particular group of students and the teachers relative comfort level with the use of a given technique.

Students performance in JSSCE Mathematics placement examination conducted annually in Kaduna state has generally been very poor and that they rarely or completely avoid attempting questions on algebraic word problems aspect of mathematics. Table 1.1 shows the summary of student's performance in JSSCE Mathematics from 2007-2014 in Kaduna state.

Table 1.1 Summary of students' performance in JSSCE Mathematics from 2007-2014.

Year	No of students registered	No. of students pass	No. of Students Fail	% Pass	% fail
2007	34263	18238	16025	53.23	46.77
2008	36129	13297	22832	36.80	63.20
2009	36996	14685	22311	39.69	60.31
2010	42338	20430	21908	48.25	51.75
2011	45949	24129	21820	52.51	47.49
2012	47248	22449	24799	47.51	52.49
2013	54829	26918	27911	49.09	50.91
2014	57575	28740	28835	49.91	50.09

Source: Examination Resource Centre (2015)

Most teachers use irrelevant and ineffective methods of teaching which among other factors contribute to students poor performance in Mathematics. The problem necessitates the need for exploration and application of effective teaching strategies that have been found to be effective to some specific environments. The need to find reliable ways of improving students retention and performance in Mathematics is becoming an international issue, this is because the conventional lecture method of teaching Mathematics which teachers in Secondary Schools have been utilizing have not been productive hence, the rate of failure been recorded. For these reasons, the researcher deems it fit that Computer Based Instruction (CBI) could improve student's retention and performance in algebraic word problem and hopefully reduce the failure in the subject.

1.3 Objective of the Study

The objectives of this study were to;

- i. investigate the effect of Computer Based Instruction (CBI) on the retention ability of junior Secondary School Students in Algebraic word problems.
- ii. assess the retention ability of male and female students in Algebraic word problems when exposed to CBI.
- iii. determine the impact of Computer Based Instruction (CBI) on the performance of Junior Secondary School Students in Algebraic word problems.
- iv. examine the performance of male and female students in algebraic word problems when exposed to Computer Based Instruction (CBI).

1.4 Research Questions

The study provided answers to the following questions:

- i. What is the difference in the retention ability of students taught algebraic word problems by Computer Based Instruction (CBI) and those taught by conventional lecture method?
- ii. What is the difference between the retention ability of male and female students taught algebraic word problems by Computer Based Instruction (CBI)?
- iii. What is the difference in the performance of the students taught Algebraic word problems by Computer Based Instruction (CBI) and those taught with conventional method?
- iv. What is the difference between the performance of male and female students taught algebraic word problems by Computer Based Instruction (CBI)?

1.5 Null Hypotheses

On the basis of the research questions, the following hypotheses stated in null form are formulated and are tested at 5% significant level.

H₀₁ There is no significant difference in the retention of the students taught algebraic word problem by Computer Based Instruction (CBI) and those taught with conventional lecture method.

H₀₂ There is no significant difference between the retention of male and female students taught algebraic word problems by Computer Based Instruction (CBI).

H₀₃ There is no significant difference in the performance of the students taught algebraic word problems by Computer Based Instruction (CBI) and students taught by conventional lecture method.

H₀₄ There is no significant difference between the performance of male and female students taught algebraic word problem by Computer Based Instruction (CBI).

1.6 Significance of the Study

The aspect of Mathematics education is very crucial and demands immediate attention for better development of Mathematics teaching and the best delivery of the National curriculum is to practice in the perspectives of classroom situation. This curriculum recommends Mathematics teachers to make use of various websites related with teaching learning materials, methodologies etc. of the subject which are floated on the internet. As a matter of fact, knowledge is being transferred by technology with the explosive growth of telecommunication technology and internet (Atkinson, 2007).

The use of information and communication technology has sharply decreased the value of traditional algorithmic skills taught traditionally and has potentially increased the value of many areas of Mathematical knowledge (e.g. probability, word problems. logic, calculus etc) which were rarely found, or even less emphasized in the school in the previous Mathematics curriculum. Thus the present delivery of Mathematics in Nigeria is not capable of meeting demands of our society. One possible alternative can be channelizing our teaching of Mathematics around ICT, which is now on the doorstep of our rural and urban students.

Continuous curriculum review in the light of the contemporary variables indicates that if Mathematics education is designed to help industry commerce, business and higher education in pure and applied disciplines then it should also address its own position and layout that helps to explore more area of research and investigation (Cockeroft, 2009). Then the question of how we can help students to construct better experience for themselves should be one of the important aspects of our Mathematics teaching.

It was obvious that mathematics concepts were usually taught using abstract examples and words. This method of teaching, which needed highly cognitive skills to assimilate the taught subject, create a solid and concrete foundation for the students.

This research finding will provide the teachers with varying approaches and methods of imparting the knowledge of Mathematics to the students thereby encouraging them to be more interested and develop positive attitude toward mathematics.

It is hoped that the findings will avail curriculum planners the opportunity to plan the process of evaluation of teaching and learning algebraic word problems concepts in the Junior Secondary Schools. This will also help in suggesting the way forward in the inculcation of Computer Based Instruction or Lecture method in learning algebraic word problem concepts.

Textbook publishers would be guided to reframe their books on algebraic word problems concepts so that new text books would be activity based and more of Computer-Based that promote thinking and de-emphasize rote learning.

The result of this study would also help the school administrators and policy makers to encourage Mathematics teachers to adopt computer based method when solving algebraic word problems.

Researchers in Mathematics education can benefit from the study because it contribute to the existing literature that is already available on the methods of teaching Mathematics in the schools and prepare ground for interested researchers who may wish to conduct further research in related areas.

The findings of this study would help professional bodies such as Mathematics Association of Nigeria(MAN), Science Teachers Association of Nigeria(STAN), National Educational

Research and Development Centre(NERDC), among others to organize seminars and workshops for Mathematics teachers on the use of computer based method in teaching algebraic word problems.

1.7 Basic Assumptions:

In carrying out this research, the following assumptions were made;

1. The school environment is conducive for the teaching and learning of Algebraic Word Problems using Computer Based-Instruction.
2. The students have some foundation of Algebraic Word Problems from their previous classes that is useful for the present study.
3. The students were taught by qualified mathematics teachers.

1.8 Scope/Delimitation of the study:

This study was delimited to the investigation of relative effectiveness of Computer Based Instruction on Junior Secondary School students' retention and performance in algebraic word problems. It was conducted in secondary schools of Kaura local government, Kaduna state. The study was restricted to only two junior secondary schools, one as experimental and the other as control group. The schools are government public schools having similar characteristics of funding, teachers, curriculum, and co-educational.

Junior secondary schools(JSSII) students of average age of 13 years were used for the study. This category of students were targeted for the study because they are relatively established and stable in secondary education more than(JSSI) students who have not yet settled down, and the (JSSIII) students who are busy preparing to write their final year examination(JSCE). The topic used is algebraic word problems concept of Mathematics, derived from the national curriculum for Junior secondary school Mathematics and it was

selected because it features in (JSSII) Mathematics curriculum. These include definition of word problems, expression of word problems in numeric forms, word problems in sum and difference, word problems on product and quotient of whole numbers, word problems involving fractions, algebraic equations on word problems and application of word problems from everyday situations. The period for the study covered a total of six weeks.

The experimental groups CBI were restricted on laptops, projector and desktops with a soft ware concept of algebraic word problems in them. The instruments for the study were Algebraic word problems performance test and Algebraic word problem Retention test with fifty items each.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

This study was designed to determine the effect of Computer Based Instruction on retention and performance in algebraic word problems among Junior secondary school students' in Kaduna State

. In this chapter the literature were reviewed based on the following sub-headings

2.2 Theoretical framework

2.3 Concept of Information and communication technology

2.4 Methods of Teaching Mathematics in Junior secondary schools

2.4.1 Computer Based Instruction Method of Teaching Algebraic Word Problems.

2.4.2 Conventional Lecture Method of Teaching Algebraic word problems.

2.5 Retention and Academic Performance in Algebraic Word Problems

2.6 Gender and Academic Performance in Mathematics

2.7 Overview of Related Studies

2.8 Implication of Literature Review on the Present Study

2.2 Theoretical Frame work

This study is based on the theoretical foundations of constructivist learning theory. Constructivism is basically a theory based on observation and scientific study of how people learn. It says that people construct their own understanding and knowledge of the world through experiencing things and reflecting on those experiences (Shuabu, 2012). Constructivist theories have been widely used in ICT strategies and the relevance of constructivism lies in the fact that knowledge is actively constructed in the mind of

learners. (Dawson, Forster & Reid 2006). A central point in constructivism is that learning is always a unique product “constructed” as each individual learner combines new information with existing knowledge and experiences. Individuals have learned when they have constructed new interpretations of the social, cultural, physical and intellectual environment in which they live. A primary role of the teacher therefore is to create appropriate learning environment in which students’ learning experience are authentic presentations of real practices in applied settings (Kearney & Triagust, 2001). Thus, the basic principle of constructivism theory is applied in this study in which learners construct meaning and create appropriate learning experience of algebraic word problems concept through Computer Based-Instruction. The interactive property of the Computer Based-Instruction coupled with the simulations and animations projected on the screen, students should hopefully be able to observe and learn some of the abstract concept of algebraic word problems. This is aimed at helping them in the learning experiences that will enhance retention and improve their academic performance in algebraic word problems concepts in line with the theoretical stipulations of constructivist principles.

2.3 The Concept of Information and Communication Technology

Over the past twenty-five years, computers and its related technologies have influenced nearly every aspect of the developed countries of the world. The exposition in information and communication technology (ICT) has increased efforts to equip the classrooms of these countries with computers. Between 1984 and 2002, the number of computers in America’s K – 12 schools only increased thirty one times to more than ten million units (US Bureau of Census, 2002). Computer hardware and software has developed rapidly over the past five year in Nigeria. The computers have become much

more powerful, easier to use, smaller, and more convenient and much more accessible. In recent years, advances such as hard disks, compact disks – read only memory (CD Roms), laser disks, and affordable printers have made computer much more useful for the educational process. Networking has allowed computers to be easily accessible to the teachers as well as easier for use with software packages. The internet has increased student interest in computers and has led to an increase in student computer literacy and skills.

ICT is developing swiftly and is taking over an increasing share in every domain of life. It is among those technologies, which have got immediate acceptance and influence a common man's pattern of life in developed and developing countries equally. The traditional classrooms lectures have been supplemented by ways and options that ICT revolution has created. The way one can access knowledge is changing never and newer roles of schools and those of teachers are evolving.

In teaching, this technology empowers students to have greater control over the learning process with all the benefits associated with active learning and personal responsibility. Not only will students decide by using ICT that when to learn and how to learn, increasingly they will also decide that to learn and how that learning is to be certified. It is in this sense that ICT “unbundles the learning enterprise from the teaching enterprise” (Massy & Zamsky, 2006). In teaching, ICT has strong potential to increase learning productivity in the areas of codified knowledge and algorithmic skills. In these specific areas, the implication is that ICT should supplement human instructors whenever possible – human intervention should be oriented mainly towards making the advantages of ICT accessible to all learners. In the case of Mathematics remediation, that might mean

monitoring student motivation and providing support at critical junctures to ensure that a student completes the program (Twig, 2007).

Although a lack of rigor in distance education research is a serious shortcoming in most of these studies, the conditions needed for experimental studies may be unrealistic for much research and evaluation conducted by educators in real classroom environments. A hidden fear surfaced in their concern that technology cannot replace the human factor in higher education. Because multimedia does not take the place of instructor, a more rational position gleaned from the research could be that ‘learning is more correctly attributable to well-orchestrated design strategies than to the inherent superiority of various media’ (Hannafin & Hooper, 2010).

A central feature of computer-based instruction is the provision of learner control the ability of learners to make their own decisions regarding some aspect of the “patch”, “flow”, or “events” of instruction (Williams, 2008). One rationale for learner control is to increase learner involvement, mental investment, mindfulness and activity. However, research has shown the type of control learners should have varies widely content as well as the characteristics of the learners themselves in any given situation (Duchastel, 2007). One major advantage of computer-based Instruction (CBI) is to provide for different needs and abilities of individual learners. Learner control is based on the assumptions that learners know what is best for them, and is capable of making appropriate choices regarding their own learning (Jonassen, 2005).

Learners differ with respect to how well they perform under learner control conditions. One important factor predicting success in learner control is prior knowledge. Carrier, Davidson and Williams (2008) found that higher ability students tended to see

more optional materials than students of lower ability (Carrier *et al*, 2008). Some studies have demonstrated that learning styles affect student performance and retention. Other studies have revealed dimensions within learning styles that are relevant to individual performance. Awareness of learning styles can be used to improve computer-assisted instruction designs (Bork,2008) and adapt instruction to improve performance and retention. According to Yoder (2009) awareness of individual differences in learning styles is essential to educators. By matching learning styles and instructional method, student performance and retention in algebraic word problems can be enhanced in a computer-based lesson (Riding, Buckley, Thompson & Hagger, 2008)

2.4 Methods of Teaching Mathematics in Junior Secondary Schools

Teaching method is very important in the impartation of knowledge in teaching-learning processes and the type adopted determines to a great extent what the students assimilate. There are different methods of teaching Mathematics in Junior secondary schools. The following methods were discussed one after the other.

- Computer Based-Instruction Method
- Conventional Lecture Method

2.4.1 Computer Based-Instruction Method of teaching algebraic word problems

Computer based instruction is a term that can be used to describe virtually any kind of instruction program using computers as a central staple. This approach to learning takes advantage of the interactive elements of computer software, along with the computer's ability to present many different kind of media. The use of computers for learning has generally increased with the advancement of technology. The ability of computer hardware to process and present many different media types has allowed for more complex computer

learning strategies. An example would be a training module that uses videos for lectures. Test and exercises are often handled in an interactive manner, and sometimes they can almost be like games depending on the style of the implementation.

In Nigeria, the low achievement in mathematics by the students has been an issue mathematics educators have been trying to improve for long. This resulted into a series of curriculum changes like Enlebbe mathematics of 1963 modern mathematics of 1970 – 1979 and present curriculum. The student's performance was still generally poor notwithstanding the curriculum changes, algebraic word problems is not an exception. The poor performances were attributed to the method of approach used and many other variables. It is therefore desirable to evaluate the method of instruction in relation to students' curriculum changes. The computer based instruction play significant role in the performance is directly connected to the computer based instruction. Computer based instruction have produced powerful information and communication tools that have important implication for education in algebraic word problems. The ever-increasing in computer based instruction has led to a question that challenges the conventional method of teaching algebraic word problems. (Jonnasen, 2005). Computer based instruction now offers the possibility for learning and teaching to take place in new settings and to inspire and facilitate lifelong education.

Computer based instruction is developing swiftly and is taking over an increasing share in every domain of life. It is among those technologies which have got immediate acceptance and influenced a common man's pattern of life developed and developing countries equally. The conventional classroom lectures have been supplemented by ways and options that computer based instruction revolution has created. The way one can access

knowledge is changing, newer and newer roles of schools and those of teachers are evolving.

Computer based-instruction will be effective in a classroom if teachers act as managers, coaches guides, initiators and facilitators. The role of teachers in this context is described briefly. When teachers take the role as a manager or an organizer they manage the learning environment for the students (Cheung, 2009). Cheung summarized those teachers' roles as a manager or organizer in the following:

“Teachers should act as the manager to manage the learning environment for the learners. Their duty includes selecting and organizing the hardware and software. When teachers take the new role, they may need to learn and use new classroom management techniques for using the software packages in the classroom. Teacher need to set up discipline rules and computer facilities to avoid the classroom management problems (Cheung 2009, p,. 190). When teachers act as a coach or a guide, or a guide/ they should show the students how and when to use online programs. Guidance might include the procedure, strategies and skills of using internet during their learning process. Teachers should provide exercise and feedbacks to the students during the use of the package.

When teachers take the role of initiator, they introduce the use of internet to the students. They explain the potential and benefits of using internet in their learning environment to the students. When teachers take the role of facilitator they provide encouragement and stimulate students to use the online programs. A study entitled “classroom instruction differences by level of technology used in mathematics” was conducted by Waxman and Hung (2010). The result of this study indicated that there were significant differences in classroom instruction by the amount of technology used.

Instruction in classroom setting where technology was not often used tended to whole-class approaches where students generally listened or watched the teacher. Instruction in classroom settings where technology was moderately used had much less whole-class instruction and much more independent work. These findings are quite similar to the researches that support the notion that technology use may change teaching from the traditional teacher centered to a more student-centered instructional approach.

Research on the effect of computer based instruction on achievement began in 1960's. Early research that has been done remained inconclusive in determining the effectiveness of computer based instruction. More recent studies are not anymore conclusive than the early studies. Baker (2006) in a study of research done on computer related approaches claims there is a lack of controlled studies. Baker found most studies were conducted by surveying students attitudes and opinions towards computer related approaches. The survey was not conducted in an experimental fashion with a control group and experimental group. Computer based instruction was leveled among the relevant factors that affect performance in mathematics. Benbry (2007) concluded that computer based instruction affect performance in mathematics.

Another study of computer based instruction on students was published by Abbas Johari (2008). Johari's subjects were 98 secondary school students in 2 sections of algebraic word problems class. The students were randomly assigned to 1 of 2 treatment groups. One group substantially more computer based instructions. The other group was taught in the conventional lecture method. Johari gave each group a pre-test and a post – test. The group that received the computer based instruction scored significantly higher on

the post-test. The author draw the conclusion that a relationship exist between the use of computer based instruction and achievement of students of algebraic word problems.

No doubt computer based instruction has significant impact on students' achievement in algebraic word problems. Thus research should be encouraged on the effect of computer based instruction on students' performance in algebraic word problems.

2.4.2 Conventional Lecture Method of Teaching Algebraic Word Problems

Mathematics lessons in secondary schools have changed relatively little in recent decades. Mathematics teachers tends to spend most of their time standing at the front of the class and asking questions, while students listen and copy down notes.

As you go up the year group towards GCE there does seem to be more transmission type teaching. Teachers have to get through the content of the curriculum and even if there are a lot of things they would like to do in lessons, often they do not have time.

With the push for different approaches for mathematics instruction in American schools which is more developed in technology compared to Nigeria, one might think it would be hard to find an advocate for continuing with conventional mathematics instruction. In a study done by Asulp (2007), two different forms of mathematics curriculums were put to the test and compared using students' achievement test (SAT) scores over a three year period. The conventional mathematics instruction used was Houghton – Mifflin while the reform (or inquiry) curriculum was cord applied mathematics. Results showed that the reform method of instruction did not appear to improve significantly over the conventional mathematics instruction. The results also showed that the traditional approach had a positive impact on procedural tasks such as computation and

equation solving. After viewing the results, the teacher in whose classroom the test was administered questioned the time and money spent to implement a reform curriculum and cautioned any mathematics department from jumping right in. The teachers responded by saying “A reform mathematics curriculum is expensive to implement; teachers must be trained and supplementary kits must be purchased. Such expenses, in his opinion are questionable since a reform mathematics curriculum did not promote an increase in student achievement- (Alsup, 2007, P. 694). In his closing remarks Alsup echoes the opinion of many current mathematics teachers today by saying, “over the decades educators have tried to develop more effective methods to teach mathematics. Though most educators agree that mathematics achievement needs to improve the current reform trend those not appear to be the answer. Further it appears to be detrimental to procedural knowledge.

A major concept in conventional mathematics instruction is the idea of spiraling. In conventional mathematics instruction, spiraling is the idea of revisiting a specific mathematical concept several times over a period of time (Wartonic, 2006) with the use of spiraling in conventional mathematics instruction; learner stress is reduced since students are not pressured into fully understanding the mathematical concept being studied the first time they are introduced to it. With reminders along the way, students can start to assimilate concepts and apply their knowledge to new concepts they will see in the future, progressively getting better at applying the concept and using it

The scene Marshall (2006) depicts of a mother and daughter working together on her math sums up what inquiry based mathematics advocates say is wrong with conventional mathematics. When the mother tells her daughter what the number are and has her repeat them back to her it is much like conventional approach to mathematics instruction students

learn best when they can make corrections, organize, clarify and reflect on their thinking (Burns, 2009) and with conventional mathematics instruction this does not happen. The problem with conventional instruction is the concept of rote learning Marshall (2006) takes the definition of “rote” from the English Dictionary which defines rote as “in a mechanical manner, by routine, especially by the mere exercise of memory without proper understanding of or reflection upon the matter in question. Through conventional mathematics instruction, children are expected to use a mathematical concept before they have been able to experience it primarily focusing on how the teacher “told” them how to use it. This style of teaching is what Michael Battista says is common in American schools, is “ineffective” and seriously stunts the growth of student reasoning and word problem solving skills (as cited by Marshall, 2006, p. 357).

2.5 Retention and Performance in Algebraic Word Problems.

Retention means storage of information over some period of time; this time period is called retention interval(Bichi, 2002). If for some reason, the subject is unable to produce the response at the end of the retention interval, forgetting has occurred. Retention works together with academic performance, retention which is the ability to retain things experienced or learned, has an area of focus to some Mathematics educators in recent years.

The performance of students in Junior Secondary School algebraic word problems has been generally poor. A number of students enter Senior Secondary School without the prerequisite knowledge and eventually fail the senior Secondary School algebraic word problem test. The problem of the poor performance at the senior secondary School level is connected to the students poor background at the Junior Secondary School level.

A study conducted by Achi (2008) revealed that only 21.3% of two hundred sampled students from Kaduna State passed a junior secondary school achievement and retention test on algebraic word problems. The result indicated that the performance and retention was poor. Thus the performance and retention was not good enough for effective beginning at senior secondary school. Dauda (2006) stated that junior secondary school stage is a stage at which a solid or poor foundation is laid in algebraic word problems. If a poor foundation is laid at this stage, it will have tremendous negative consequences on students performance at higher levels. He stated further that students at junior secondary school stage require sound knowledge, computational skills and problem-solving ability. He then recommended that more emphasis should be attached to students at junior secondary school stage as this stage determines future success. Danjuma (2009) studied some predictors of students deficiencies in junior secondary school algebraic word problems. He pointed among others, lack of motivation, poor method of instruction and inadequate funding. He stated that if these factors are not improved, students' performance would continue to be poor. In a similar study, Kasang (2011) evaluated students' skills in junior secondary school II students in Nasarawa State and administered an achievement test. She concluded that the students had good skills in numeration and statistics, fair skills in geometry and poor skills in algebraic word problems. She recommended that teachers and students should pay more attention to algebraic word problem aspect. In a related discovery, Kaboshio (2005) revealed that students at junior secondary school level consistently performed better in numeration than in algebraic word problem. He stated further that students at that level apply their little knowledge of algebraic word problems to familiar or

unfamiliar problems. He then described word problems among the difficult aspects of junior secondary school mathematics.

The general performance of students in junior secondary school mathematics examination is poor. The worst results usually come from word problem aspect. The poor performance is attributed to lack of facilities, lack of adequate motivation poor method of instruction, inadequate funding and many other variables. Learning mathematics includes solving various types of problems, from those which requires performing arithmetical operations to those which require problem solving skills. Children are faced with mathematical word problems and consist of both words and numbers as early as the pre-school age, and also later in school mathematics. Effective solving of these problems primarily requires comprehension. In doing mathematics, initial thought may involve working with numbers and symbols to find answer to problems. Often, mathematics is been believed to have less of language burden than other content area classes (Chamet & Omalley, 2008). The reality is however that there is a large amount of language that mathematics students must attend to in order to understand and solve mathematics problems.

The language of Mathematics word problems when one thinks about Mathematics, symbols and numbers usually come to mind. The idea that mathematics is very rich in language may not seem apparent at first. The reality however, is that mathematics language is very specialized. In fact, mathematics has its own distinct language register that makes use of specialized vocabulary and syntax (Kang & Pham, 2007). Native speakers of English language learners alike must learn this special language of mathematics in order to be successful in mathematics. The language of mathematics is especially challenging to

English language learners who are learning this academic language alongside the social language they need for the purpose of basic communication. The complexity lies primarily in the dense nature of mathematics text, and also in the learning of the semantics and syntax of the mathematical register (Kang & Pham, 2007). Hence mathematical word problems should be given more attention.

2.6 Gender and Academic Performance in Mathematics among Junior Secondary School Students.

The concept of “gender” in teaching and learning process has attracted the attention of many researchers. Gender is a socio-cultural construct, a category that sort and organizes social relationship between human male and female (Scott, 2005). Besides the influence of teaching strategies and other related problems, gender has also been considered an important factor that mediates between performance and cognitive achievement in Mathematics. Available literature have not been able to identify a single direction of difference in performance in Mathematics between male and female students (Kadiri, 2004). Although most researchers have found boys performing better than girls, a few others saw girls out-performing boys while some others established no significant difference.

Alio and Harbor Peters (2002) found significant gender effects in their study in favour of male. Also result of the study conducted by Usman (2007) shows that boys performed well in any “rigorous” work, while girls show to settle seated for less rigorous work. Bichi (2008) in his study believed that girls perform better than boys in problem solving type of activities. In another dimension, if boys and girls are given the equal opportunities, they will perform equally well (Yoloye 2004 & Nworgun 2005). Whereas Ohalebo (2002) in his own study found no significant gender effect and thus concluded that

gender effects, on Mathematics learning remains a continued topic issue. The issue of gender in Mathematics teaching seems to be a controversial. The differences in the scholastic achievement of boys and girls are generally attributed to biological causes, cultural and stereotypes(Nworgun, 2005). The last two decades have been devoted to addressing gender inequality in education; some studies have shown an all time low participation of women in education. Researchers have therefore expended tremendous efforts in the study of the personal factors affecting academic performance especially in Mathematics education notable among these variables is the study of the phenomenon of gender in education.

Today, gender differences in learning Mathematics continue to be a focus of interest and majority of studies show that there is a communal believe that males are better in Mathematics(Yazici &Ertekin, 2010).Fennema and Leder(2010) also identify differential teacher interactions with boys than girls, they praise and scold boys more than they do to girls and called on boys more than girls. In spite of all these evidences, the impact of their differential treatments is unclear and uncertain. Yet, the data collected from these teachers treatments of boys and girls causes gender differences in Mathematics. In Nigeria, gender issues abound in all spheres of the society. The educational conditions of the girl-child vis-à-vis the boy-child constitute an important gender issue. In our cultural setting, the cultural and traditional responsibilities of men and women are different, hence the influences in upbringing of the female child and male child. However, this study is particularly interested in determining the effectiveness of Computer Based-Instruction on gender when taught algebraic word problem concept of Mathematics.

2.7 Overview of Related Studies

In Computer Based-Instruction literature, there have been numerous studies on the use of computers in Mathematics education (Glikman, 2000; Ruffin, 2002; Sundruck, 2003; Drijrer & Kirtschner 2009). Such studies suggested that the use of computer is successful in improving student's achievement, promoting positive attitude of students toward Mathematics and in particular that students' motivation is enhance by cooperative learning involving students' computer interactions. Computer Based-Instruction curricula also provide opportunities for enquiry-based approaches to the teaching of Mathematics, and it seems they discourage rote memorization and algorithmic problem solving while encouraging conceptual understanding and critical thinking Hasselbring(2009). For this reason, many researchers now advocate the use of computers in Mathematics classrooms and Computer Based-Instruction environment attain to make explicit the information embedded in traditional algebraic word problems representations as well as to provide a visual representation of algebraic word problems interaction for students. In this way, students can learn Mathematics by viewing algebraic word problems animations. Such an approach is in contrast to conventional Mathematics lectures that rely almost entirely on verbal explanation of concept meaning students have little opportunity to view algebraic word problems interaction.

Bolaji(2005) undertook a study on effectiveness of computer assisted instruction in teaching introductory statistics. The researcher used quasi-experimental design and his sample population covered 205 students. After analysis with t-test, the result of the finding shows that students taught with computer assisted instruction perform significantly better than conventional lecture group. In another study Yusuf & Afolabi(2010) investigated the

effect of computer-assisted instruction on secondary school students performance in Biology. The researcher used gender as variable. Quasi-experimental involving 3x2 factorial designs were used in the study. Their sample for the study covered 120(SSS1) in Oyo state, Nigeria. The students were pre-tested and post-tested, and analysis of covariance(ANCOVA) was used for data analysis. The finding of their study showed that the performance of students exposed to computer-assisted instruction either individually or cooperatively were better than their counterparts exposed to the conventional classroom instruction. However, no significant differences existed in the performance of male and female students exposed to computer-assisted instruction in either individual or cooperative settings.

Akçay and Unal, (2009) compared the effect of computer-assisted instruction on the learning of black body, Compton, x-ray topics by pre-service science teachers with the method of traditional teaching. Their sample covered 70 students from two different classes. T-test was used for data analysis. The time extent covered a period of two weeks. Computer-assisted instruction was used in experimental treatment while the instruction of same subjects in control group was performed by using a traditional instruction method. The result of their study showed that students taught with computer-assisted instruction performed higher than those in traditional teaching group. This study is not in Nigeria and covered within two weeks only. The present study therefore is set to investigate the effect of computer-based instruction on students' retention and performance in Nigerian secondary schools covering a period of six weeks.

2.8 Implications of Literature Review on the Present Study

The chapter has provided some information on the theoretical and practical studies of similar studies conducted. It has specifically looked at theoretical framework of the study, methods of teaching mathematics, retention and academic performance in Mathematics, gender and academic performance in Mathematics. The main implication of this study provides the empirical evidences to show that the students learning in Computer-Based Instruction have some impact on students' retention and performance in algebraic word problems in terms of their understanding and applicability and students are able to integrate their learn concept to construct knowledge.

Yusha'u (2004) revealed that students in Nigerian secondary schools have difficulties in learning abstract concepts of Mathematics such as trigonometry, statistics and algebraic word problems thus students found the subject boring. To ensure meaningful learning and therefore, improve academic performance and retention, several and specific instructional strategies that are suitable to bring readiness to the problem have been found in the literature. One of such instructional strategies that are gradually gaining research attention of recent time, is Computer-Based Instruction for students learning Mathematical abstract concepts. From the literature cited most of the studies carried out, were using different concepts, different instructional strategies and different study area. A similar study is hereby being undertaken on the algebraic word problem concept of Mathematics to find out the relative effectiveness of Computer-Based Instruction on students' retention and academic performance in algebraic word problems concept among Junior secondary school students in Kaura local government, Kaduna state-Nigeria.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This study investigated the Effects of Computer – Based Instruction on Retention and Performance in Algebraic Word Problems among Junior Secondary School Students in Kaduna State, Nigeria. The chapter discusses the general structure and designed within which the research is conducted. It includes all the plans implore in accomplishing the objectives of the study. Thus, the chapter is presented over the following sub headings:

- 3.2 Research Design
- 3.3 Population of the Study
- 3.4 Sample and Sampling Technique
- 3.5 Instrumentation
- 3.6 Validity of the Instrument
- 3.7 Pilot Testing
- 3.8 Reliability of the Instrument
- 3.9 Administration of the Treatment
- 3.10 Procedure for Data Collection
- 3.11 Data Analysis

3.2 Research Design

The study utilized quasi experimental design involving pretest, posttest and post-posttest. This is made of two groups; experimental and control. The experimental groups (EG) were exposed to Computer-Based Instruction and the control groups (CG) were exposed to conventional lecture method. A pre-test (O_1) was administered to the two groups to determine the equivalence of performance of students prior to the treatment (see appendix

K). This is followed by a post-test (O_2) which was administered after the treatment for a period of six weeks to determine the relative effectiveness of Computer-Based Instruction on students' academic performance in algebraic word problems concept. After an interval of two weeks of the post-test, post-posttest (O_3) was administered to students to determine retention ability in both groups. The illustration of the research design is presented in figure 3.1.

$$\begin{array}{l}
 EG \rightarrow O_1 \rightarrow X_1 \rightarrow O_2 \rightarrow O_3 \\
 CG \rightarrow O_1 \rightarrow X_0 \rightarrow O_2 \rightarrow O_3
 \end{array}$$

Figure:3.1 Schematic Illustration of the Research Design

KEY

EG= Experimental Group

CG= Control Group

X_1 = Teaching using Computer-Based Instruction(treatment)

X_0 = Teaching using conventional Lecture Method only(no treatment).

O_1 = Pretest

O_2 = posttest

O_3 = Postpost-test

3.3 Population

The population of this study covered all the junior secondary year two (JSS2) students of Kaura Local Government Area of Kaduna State. This is made up of seventeen (17) junior secondary schools with a total enrollment of two thousand, four hundred and forty five (2445) students. Out of the seventeen(17) junior secondary schools, five(5) are private schools, while twelve(12) are public schools. Sixteen(16) schools are coeducation

schools, only GC Kagoro Junior secondary school is a single sex (male) school as presented in table 3.1

Table 3.1: Population of the study Area

S/No	Name of school	Location	Sex		No. of Students (JSS2 Enrolment)
			Male	Female	
1	GJSS Manchok	Manchok	118	113	231
2	GJSS Bondong	Manchok	87	78	165
3	GJSS Fada Atakar	Atakar	103	80	183
4	GJSS Zankan	Manchok	94	78	172
5	GJSS Kadarko	Kagoro	90	101	191
6	GJSS Kagoro	Kagoro	125	102	227
7	GJSS Fada Daji	Kagoro	92	99	191
8	GJSS Malagum	Kagoro	107	73	180
9	GJSS Tum	Kagoro	78	92	106
10	ECWA Jnr. Sec Sch	Kagoro	41	38	79
11	GC Kagoro Jnr.	Kagoro	102	00	102
12	GJSS Mahuta	Manchok	40	68	108
13	St. Francis College Jnr.	Manchok	53	42	95
14	GJSS Magata	Kaura	78	80	159
15	Excellence High School	Kagoro	44	39	83
16	Elim Foundation School	Kagoro	52	36	88
17	Nasara Academy	Kagoro	31	48	79
Total			1582	863	2445

Source: Kafanchan Inspectorate Division, (2014)

3.4 Sample and Sampling Technique

Two co-educational schools were selected using the simple random sampling procedure from the schools in the study area. The schools are namely: Government Secondary School (GSS) Manchok and Government Secondary School (GSS) Kagoro. However, GSS Manchok was selected purposively as the experimental school while GSS Kagoro was taken as the control school. This was because GSS Manchok is already equipped with computers for student's use. One intact class in each of the schools was selected using the simple random sampling from the JSS 2 arm of each school for the study. This was because the school administration does not allow disorganization

(randomization) of students for the purpose of research so that normal school activities are not disturbed. Consequently, 98JSS2 students made up the sample for the study. The schools selected were homogenous with very similar conditions in terms of staffing, provision of equipment, instructional materials, enrolment as well as year of establishment. Table 3.2 shows the distribution of these two schools into experimental and control group. The Table also presents the number of male and female students who participated in each in the study.

Table 3.2: Sample Selected for the Study

S/No	Name of School	Status	Male	Female	Total
<i>1</i>	GJSS, Manchok	Experimental	28	22	50
<i>2</i>	GJSS, Kagoro	Control	25	23	48
	Total		53	45	98

3.5 Instrumentation

Two research instruments were developed by the researcher and used for this study:

1. Algebraic Word Problems Performance Test (AWPPT); and
2. Algebraic Word Problems Retention Test (AWPRT).

3.5.1 Algebraic Word Problems Performance Test (AWPPT)

Algebraic word problem performance test (AWPPT) is an instrument developed by the researcher consisting of 50 objective test items using content on algebraic word problem concepts. This topic is derived from the national curriculum for Junior secondary school Mathematics and it was selected because it features in (JSS2) Mathematics curriculum. It was used to determine the performance of students in algebraic word problem concept in Mathematics.

3.5.2 Algebraic Word Problems Retention Test (AWPRT)

Algebraic Word Problems Retention Test (AWPRT) is designed to measure the students' retention ability on algebraic word problems. It is a test with equal contents as the (AWPPT). It was the same test of similar difficulty and format but with the position of some questions transformed.

3.6 Validity of the Instrument

The Algebraic Word Problems Performance Test (AWPPT) and Algebraic Word Problem Retention Test (AWPRT) were validated by presenting copies to three qualified experts, Ph. D holders with minimum rank of senior lecturers in Mathematics department and science education department, Ahmadu Bello University Zaria, for validation. After the validation, some adjustments were made by the researcher as suggested by the experts. The algebraic word problems content covered are represented in the table of specification below.

Table 3.3 Table of Specification for Algebraic Word Problem Concept based on Bloom's Taxonomy

Content	Know	Com	App	Total	%
Expression of Algebraic word problem in numeric terms	4	3	3	10	20
Concept of AWP on sum and difference	3	3	2	8	16
AWP on product and quotient of whole numbers	3	3	2	8	16
AWP involving Fraction	4	4	4	12	24
Algebraic equation on word problems	2	2	2	6	12
Application equation on word problem	2	2	2	6	12
Total	18	17	15	50	

3.7 Pilot Testing

In order to refine the test items and to determine reliability coefficient of the research instrument, Pilot study was carried out in one of the secondary school within the target population but did not form part of the sample(GJSS Fadan Atakar). Algebraic word problem performance test was administered to a group of 40 students by the researcher, which lasted for $1\frac{1}{2}$ hr. Instruction on how to answer the questions was read and explained to the students. After two weeks a re-test was given to them following the same procedures of the first test as recommended by Tuckman (1975). Their scores were recorded see appendix (D).

3.8 Reliability of the Instruments

The reliability coefficient of the instrument was determined after pilot testing, using test, re-test method. The results of the test were compared and computed using Pearson product moment correlation with the aid of (SPSS) software package and the reliability coefficient was found to be 0.81. The result of the reliability test was shown in appendix E.

3.9 Administration of Treatment

The research instrument was administered before treatment as pre-test. Students in experimental group received instruction using Computer-Based Instruction as treatment while students in control group received instruction using lecture method only. The teaching last for a period of six weeks after which the same instrument was re-administered to students as post-test to determine students' academic performance in algebraic word problems concept. After two weeks of post-test, the transformed algebraic word problems performance test was re-administered to both groups as a post-posttest to determine the students' retention ability. The experimental group received treatment using Computer-

Based Instruction software developed using Microsoft office power point. The software is based on the concept of algebraic word problems installed into the computers using flash drive, CD-ROM drive and projected on the screen; the treatment follows the subsequent steps as in the lesson plan.

The control groups were taught the same concepts of algebraic word problems by the researcher using conventional lecture method. No computer software was used in teaching the control group. The subjects were referred to relevant Mathematics textbooks for more information. Written assignment was given to the subject after each lesson as demanded by the lesson plan.

3.10 Procedure for Data Collection

After teaching the experimental and control group post-test was administered using algebraic word problems performance test(AWPPT) which measured the academic performance of the students of both groups. Two weeks later a post-posttest(AWPRT) was administered which measured the retention ability of the students of the two groups. Both the AWPPT and AWPRT were conducted during the school hours in order to avoid absenteeism and improve respondents' control. The students spent $1\frac{1}{2}$ hours for both the AWPPT and AWPRT. The answers scripts were collected by the researcher and marked fairly and honestly by the researcher. The list of the scores of the students were prepared as presented in appendices B and C.

3.11 Procedure for Data Analysis

The data obtained from the study was analyzed using descriptive and inferential statistics to answer research questions and test the null hypothesis raised. All the four null hypotheses stated were analyzed using t-test independent statistics. This is for the purpose of

determining significant different (if any) between the experimental and control group performances. Significant level of $p \leq 0.05$ was used to retained or reject the hypothesis tested.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND DISCUSSION

4.1 Introduction

The analysis and results of the data collected and their discussion are presented in this chapter. The data collected were analyzed using the statistical package for social science (SPSS) and the level of significance adopted for rejecting or retaining the stated null hypothesis was $P \leq 0.05$ (see appendix L, M, N, & O).

Research instrument called Algebraic word problem performance test (AWPPT) and Algebraic word problem retention test (AWPRT) were used in collecting the following data.

- Post test data which were analyzed to determine the academic performance level of both the experimental and control groups.
- Post test data of experimental group only which were analyzed to determine the gender difference in the performance of male and female students in the experimental group.
- Post post-test data which were analyzed to determine the retention ability of both experimental and control groups.
- Post-posttest data of experimental group only which were analyzed to determine the gender differences in the retention of male and female students in the experimental group.

The chapter is presented in the following sub-headings

- Data presentation and analysis of result
- Summary of findings
- Discussion

4.2 Data Presentation

The performance of the students in algebraic word problems using Computer Based-Instruction and conventional lecture method was analyzed by the descriptive statistics presented in Table 4.1

Table 4.1 Descriptive Statistics for Performance between Experimental and Control Group

Groups	N	Mean	S.D	Mean Differences
Experimental Group	50	58.94	18.784	19.232
Control	48	39.71	20.923	

Table 4.1 presented data on the mean and standard deviation of academic performance of students in experimental and control groups. From their mean score, the experimental and control groups obtained 58.94 and 39.71 respectively with a mean difference of 19.232 which indicates that the experimental group had a higher mean score compared to the control group. Also, the experimental group had a standard deviation score of 18.784, while the control group had 20.923 as its standard deviation. This implies that there is a difference in the mean and standard deviation scores of the two groups in favour of experimental group.

Data on gender difference in algebraic word problems using Computer Based-Instructions was analyzed with descriptive statistics of mean and standard deviation as shown in Table 4.2.

Table 4.2 Descriptive Statistics for Performance of Male and Female Students in the Experimental Group

Groups	N	Mean	S.D	Mean Differences
Male	28	60.89	20.518	-5.925
Female	22	66.82	15.277	

Table 4.2 the result showed that the mean differences of the students is -5.925 from score of 60.89 and 66.82 respectively. The standard deviation for both male and female

students was 20.518 and 15.277 respectively which mean that the mean score of female is higher than that of their male counterpart.

Data on retention ability of students using Computer Based-Instruction and Conventional Lecture method was analyzed with descriptive statistics of mean and standard deviation as shown in Table 4.3

Table 4.3 Data on Retention Ability of Students between Experimental and Control Groups

Groups	N	Mean	S.D	Mean Differences
Experimental	50	48.04	18.746	15.561
Control	48	32.48	14.222	

Table 4.3 presented data on the mean and standard deviation on retention ability of students in experimental and control groups. From the result obtained, there are differences in the mean score of experimental and control groups. Students exposed to computer based-instruction have mean score of 48.04 while the students exposed to lecture method have mean score of 32.48 with a mean difference of 15.561 which shows that the experimental groups had a higher mean score compared to the control group.

Data on retention ability in gender using Computer Based-Instruction was analyzed with descriptive statistics of mean standard deviation as shown in Table 4.4.

Table 4.4: Data for Retention Ability of Male and Female Students in the Experimental Group.

Groups	N	Mean	S.D	Mean Differences
Male	28	45.86	19.588	-4.96
Female	22	50.82	17.671	

Table 4.4 the results showed that the mean difference between the scores of male and female students is -4.9661 from scores of 45.86 and 50.82 respectively. The standard deviations of both male and female students were 19.588 and 17.671 respectively. This implies that there is a difference in the mean and standard deviation of both male and female students.

Test of Hypotheses

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

H₀₁ : There is no significant difference in the performance of the students taught Algebraic word problems by computer based instruction and those taught by conventional lecture method.

The posttest data generated through Algebraic Word Problem Performance Test (AWPPT) were subjected to t-test statistic to determine if there is any significant difference between the academic performance of the experimental groups and those of the control group. Summary of the analysis is shown in Table 4.5

Table 4.5: t-test analysis of Posttest Mean Scores of Experimental and Control Groups

Groups	N	Mean	S.D	df	t-value	P-value	Decision
Experimental	50	58.94	18.784	96	4.792	0.001	*
Control	48	39.71	20.923				

***Significant at $P \leq 0.05$**

The result of the t-test shown in Table 4.5 shows that t-value calculated 4.792 and P-value of 0.001 were observed at df=96. Since the P-value is less than the alpha value of 0.05, there is significant difference between the two groups in terms of their mean academic performance scores in the post test. This indicated that experimental group had performed better than the control group. Therefore, the null hypothesis that stated there is no

significant difference in the performance of the students taught Algebraic word problem by computer based-instruction and those taught by conventional lecture method was rejected.

H0₂: There is no significant difference between the performance of male and female students taught Algebraic word problems by computer based instruction. The post test data generated through Algebraic word problem performance test (AWPPT) were subjected to t-test statistic to determine if there is any significant difference between the academic performance of male and female students. Summary of the analysis is shown in Table 4.6

Table 4.6: t-test Analysis of post-test mean scores of males and female students in the experimental Group

Groups	N	Mean	S.D	df	t-value	P-value	Decision
Male	28	60.89	20.578	48	-1.130	0.264	**
Female	22	66.82	15.277				

****Not Significant at P > 0.05**

To determine whether the performance of the boys and girls differs following the respective treatment, the post-test mean academic scores were subjected to t-test. The result shown in table 4.6 shows that t-value calculated -1.130 and P-value of 0.264 is observed at df=48. Since the P-value is greater than the α -value ($\alpha = 0.05$), this showed that there is no significant difference in the post-test mean academic performance scores between males and female students taught using computer based-instruction. Based on this result, the null hypothesis which states, “There is no significant differences between the performance of male and female student taught Algebraic word problem by computer based-instruction is retained.”

H0₃: There is no significant difference in the retention ability of the students taught algebraic word problem by computer based-instruction and those taught with conventional lecture method.

The post posttest data generated through algebraic word problem retention test (AWPRT) were subjected to t-test statistics to determine the achievement of the experimental group and the control group. Summary of the analysis is shown in Table 4.7

Table 4.7: t-test analysis of the post –post-test mean score of the experimental and control groups

Groups	N	Mean	S.D	df	t-value	P-value	Decision
Experimental	50	48.04	18.746	96	4.615	0.001	*
Control	48	32.48	14.222				

***Significant at $P \leq 0.05$**

To determine whether computer based-instruction and lecture method affect students retention ability level, following the respective treatments, the post-post-test mean academic scores of experimental and control group were subjected to t-test. The result is shown in table 4.7 T-value calculated 4.615 and P-value is less than the alpha value=0.05, is evident from the result obtained that there is significance difference in the post posttest mean academic performance scores between experimental and control groups.

Based on this result, the null hypothesis which stated, “There is no significant difference in the retention ability of students taught algebraic word problems by computer based-instruction and students taught with conventional lecture method” is rejected.

H0₄: There is no significant difference between the retention ability of male and female students taught algebraic word problems by computer based-instruction.

The post-posttest data generated through Algebraic Word Problems Retention Test (AWPRT) were subject to t-test statistic to determine if there is any significant difference between the retention ability of male and female students exposed to computer based-instruction. Summary of the analysis is shown in Table 4.8.

Table 4.8: t-test analysis of post-posttest mean score of male and female students exposed to computer based instruction.

Groups	N	Mean	S.D	df	t-value	P-value	Decision
Male	28	45.86	19.588	48	-0.928	0.358	**
Female	22	50.82	17.671				

****Not Significant at $P > 0.05$**

The result of t-test above shows the responses of male and female students in Algebraic word Problem Retention Test (AWPRT). It appears from the table that p-value observed (0.358) is greater than the alpha value (0.05) at $df=48$. Thus the null hypothesis which stated that; there is no significant difference between the retention ability of male and female students taught algebraic word problems by computer based instruction is retained.

4.3 Summary of Findings

The findings of this study were summarized as follows:

- i. That there exists significant difference between the mean algebraic word problem concepts scores of students taught with Computer Based-Instruction and Conventional Lecture Method, that is Computer Based-Instruction students performed better than Conventional Lecture Method students.
- ii. There is no significant difference between the mean academic performance scores of male and female students taught Algebraic word problems concepts using computer based-instruction. The male and female students performed equally well.

- iii. There exists significant difference in the retention ability of students taught algebraic word problems with Computer Based-Instruction and those taught with Conventional Lecture Method. Those taught with Computer Based-Instruction method retained better than those taught with Conventional Lecture Method.
- iv. There is no significant different between the retention ability score of male and female students taught Algebraic word problem concepts using computer based-instruction. The male and female students performed equally well.

4.4 Discussion of Findings.

This study investigated the Effects of Computer – Based Instruction on Retention and Performance in Algebraic Word Problems Among Junior secondary School Students in Kaduna State, Nigeria. To achieve this aim, students in the experimental group were taught algebraic word problems concept using the computer based-instruction while students in the control group were taught the same concept using conventional lecture method. The students in the experimental group and control group were post-tested and post-post tested, their academic performance and retention changes were compared and measured.

The result of the testing hypothesis one, show that the students in the experimental group who were taught algebraic word problems concept using computer based-instruction performed significantly better and achieved higher than their counterparts in the control group. The significant difference in academic performance is in favour of the experimental group suggesting a greater effectiveness of computer based-instruction over the conventional lecture method in teaching algebraic word problem concept. This shows that the use of computer based- instruction in teaching algebraic word problems concept is viable in enhancing students' academic performance at junior Secondary school level of

education. Therefore, the result of this study have shown that the use of technology in constructivist learning teaching and learning environment has significantly improved students' academic performance scores in algebraic word problem concept. The findings emanating from this study are in agreement with findings of Johari (2008) who found and reported that there was significant difference in the performance of students taught mathematics using CBI. The findings are in conformity with Akcay and Unal, (2009) who opined that computer based instruction improve the performance of students on the learning of black body. Compton. X-ray and supported by Waxman and Hung (2010) who added that there is significant difference in classroom instruction by the amount of technology used.

Hypothesis two centered on gender related difference on academic performance of male and female exposed to Algebraic word problem concept using computer based-instruction, the post-test result of testing hypothesis two shows there is statistically no significant difference between the post-test means score of male and female student. This implies that the level of academic performance in Algebraic word problem concepts of male and female students exposed to computer based-instruction is relatively the same. This finding agrees with the findings of Yusuf and Afolabi, (2010) who in their study found out that male and female students did not differ significantly in their performance when they are taught biology concept using computer aided instruction package.

Hypothesis three focus on retention ability between students taught algebraic word problem concept using computer based-instruction and those taught using conventional lecture method. The post-post test score results showed that experimental group taught algebraic word problems concept using computer based-instruction retained better than

their counterpart in control group. This finding agrees with that of Efe& Efe (2011); Alhassan &Dantani (2013) who investigated the effect of computer assisted instructional package on junior secondary school student's achievement and retention in geometry concept. Their result shows that there is significant difference between the post-posttest mean score of experimental and control in favour of experimental group who have higher mean score and higher retention ability. This shows that the computer based-instruction package used enable subject in the experimental group to retain more knowledge of concept taught than the subject taught using conventional lecture method. Also this finding is in agreement with the findings of Bichi (2002) who observed that understanding and retention are product of meaningful learning when teaching is effective and meaningful to students, retention will improve.

Hypothesis four focus on retention ability between male and female student taught algebraic word problem concept using computer based-instruction. The post-posttest result of testing hypothesis four shows there is no significant difference between the post-post test mean score of male and female student. This implies that their retention ability is the same when exposed to computer based-instruction. This finding is in agreement with that of (Yoloye 2004 & Nworun 2005) who observed that if boys and girls are given the equal opportunities they will perform equally well.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Introduction

In this study, the relative effectiveness of two instructional strategies in teaching algebraic word problems concept among Junior Secondary schools students were investigated. In the last chapter, data collected via algebraic word problem performance test and algebraic word problem retention test were analyzed in relation to four null hypothesis outlined to guide the investigation. The result was subsequently discussed. This chapter is organized and presented under the following subheadings:

- 5.2 Summary
- 5.3 Summary of major findings
- 5.4 Conclusion
- 5.5 Recommendation
- 5.6 Contribution to knowledge
- 5.7 Limitations
- 5.8 Suggestion for further studies

5.2 Summary

The background of the study was discussed; problems that prompted the researcher to carry out the study, theoretical framework and significance of the study were discussed accordingly. The study has four research objectives, four research questions, and four hypotheses respectively. Relevant and related literatures which were reviewed based on the following sub-headings. Theoretical framework, concept of information and communication technology, method of teaching mathematics in Junior Secondary Schools,

Retentions and academic performance in algebraic word problems , Gender and academic performance in mathematics ,overview of related studies, implication of literature review on the present study.

The research design, research methodology were discussed, the population of the study comprised a total number of two thousand, four hundred and forty five (2445) students. A sample of (98) junior secondary year two students were selected from two secondary schools in the study area using simple random sampling techniques. A-50 items multiple choice research instrument tagged Algebraic word problem performance test (AWPPT) with reliability coefficient of 0.966 was used to collect relevant data which were analyzed using t-test with the aid of statistical package for social science software (SPSS). The result of the analysis of data is summarized as follow:

Students taught algebraic word problem using Computer Based-Instruction method (CBI) had a higher mean performance and retention ability compared to those taught by the Conventional lecture Method. Also a significant difference was found between the students taught algebraic word problems using CBI and those taught using the Conventional Lecture Method. These results implied that the CBI was more effective in improving students' performance and retention in algebraic word problems.

A very slight difference was observed in the mean performance and retention ability score of students with respect to gender in favor of the female students. This difference was not significant when further analysis was done. Hence CBI is a gender friendly strategy.

5.3 Summary of Major Findings

The following comprised the major finding from the study;

- i. The study revealed that the CBI is more effective in the teaching of algebraic word problems compared to the conventional lecture method.
- ii. The CBI is a gender friendly method for teaching algebraic word problem.
- iii. The CBI produces better retentive ability in students than the conventional lecture method.
- iv. Lecture method of teaching appears to be less effective in teaching algebraic word problem concept as it tends to negatively affect the student's academic performance and retention toward algebraic word problem concept.

5.4 Conclusions

Based on the findings from this study, the following conclusions were made

1. Computer based instruction method is a more effective instructional approach in teaching the concept of algebraic word problems to secondary school students.
2. Computer based-instruction method appears to promote students retention and it is gender friendly.

5.5 Recommendations

Based on the findings, the following recommendations were made:

1. Teachers should employ the CBI in the teaching of algebraic word problems in junior secondary schools to enhance students' performance and retentive ability.
2. Workshops and seminars for mathematics teachers should be organized by the Ministry of Education for each educational zone in Kaduna State on the use of CBI.

3. Teachers of other science based subjects such as physics, chemistry and biology should utilize CBI in the teaching of some concepts.
4. The National Educational Research and Development Centre (NERDC) should encourage the use of CBI as a method for teaching algebraic word problems and mathematics. This would make CBI acceptable among teachers and students.

5.6 Contribution to knowledge

This study established that

- i. The use of Computer Based Instruction (CBI) is effective in the teaching of algebraic word problems by enhancing the performance and retention of students.
- ii. The research instruments used in this study (AWPPT and AWPRT) can be adopted by other researchers when investigating the effect of teaching methods on Algebraic word problems
- iii. CBI has been observed to enhance the performance and retention of students equivalently with respect to gender.
- iv. The findings of the study have added to the body of existing literature on the use of CBI as a method of teaching some mathematical concepts.

5.7 Limitations of the study

This study has some limitations which include the following:

- i. Irregular power supply and high cost of fuel was a challenge to the study.
- ii. Getting students to participate in a computer classroom was very difficult because some of the students have little knowledge of computer operation.

- iii. Some of the computers were in a bad state, the researcher had them repaired so that students will have enough computers to use.

5.8 Suggestion for Further Studies

Based on the findings revealed from the study, suggestion for further studies were made

1. This study was limited to junior secondary two students in Kaduna state, it can therefore be replicated with a larger sample size for generalization
2. Further research could be conducted on other subject as science and languages
3. Different kind of educational software could be utilized in order to assess the attribution of a particular software type
4. Researchers could carry out research studies to provide effectiveness of CBI not only on performance and retention but also on attitude, motivation among others
5. There is need to further investigate the roles, if any gender difference play in the interaction between teaching strategy and kind of curriculum taught at the different level of education

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APPENDIX A
Pre-Algebraic Word Problems Performance Test

Instructions: Select from A – D the correct answer of the questions. You are to answer all the question which carry equal marks.

Time allowed 1 ½ hours

1. Last year a basketball player scored 513 points. This year he has scored 466 points.

How many points must he score to have the same points as last year?

- A. 47
- B. 57
- C. 153
- D. 157

2. Jose, Adam and Dan each bought 9 balloons. What is the total number of balloons

the 3 friends bought?

- A. 3
- B. 12
- C. 27
- D. 36

3. Dana played a total of 28 soccer games during the month of June, July and August.

She played 19 games in June and July. How many games did she play in August?

- A. 8

- B. 9
- C. 10
- D. 11

4. Gary read his book on 3 different weeks, $234 + 234 + 134 =$ _____

- On week 1, Gary read 234 pages of the book
- On week 2, he read the same of pages on week 1
- On week 3, he read 100 pages less than he read on week 2

What was the total number of pages Gary read?

- A. 334
- B. 468
- C. 568
- D. 602

5. There are 15 students waiting to have their school pictures taken. Each picture takes three minutes. What is the total number of minutes it will take for all these to have their picture taken?

- A. 5
- B. 12
- C. 18
- D. 45

6. Express the following statement as algebraic equations “ the result of taking 2 from n and multiplying the answer by 4 is the same as multiplying n by 3 and taking away 5

- A. $4(n-2) = 5(n-3)$
- B. $4(n-2) = 3n-5$
- C. $4(n-2) = 5-3n$
- D. $4(2-n) = -2n$

7. Solve the equation $4(3-5n)-7(5-4n)+3 = 0$.

- A. $5/2$
- B. $3/5$
- C. $3/7$
- D. 1

8. Change the following expression into word. $20 - (3+9)$

- A. Subtract the sum of 3 and 9 from 20
- B. Add the product of 3 and 9 to 20
- C. Subtract 20 from the sum of 3 and 9
- D. Add the sum of 3 and 9 to 20

9. Number greater than n is?

- A. $n+3$
- B. $1/n$
- C. $3-n$
- D. $n-3$

10. Laraba has x kobo, Kunle has 15 kobo less than Laraba. Together the number of kobo they have is?

- A. $x-15$
- B. $2x$
- C. $2x-15$
- D. $2x+15$

11. If 20 is divided by the sum of 5 and n , if the result is 4. What is n ?

- A. 10
- B. 0
- C. 7
- D. -7

12. When 48 is divided by the sum of 5 and a certain number, the result is 3. What is the number?

- A. 11
- B. 0
- C. 26
- D. 15

13. I think of a number and subtract 5 from it, I divide 72 by the result and my answer

is 4. What number did I think of?

- A. 13
- B. 32
- C. 42
- D. 20

14. A brother is 3 years older than his sister. 5 years ago, the ratio of their ages was 4:3.

Their present ages are?

- A. 17 and 13 years
- B. 14 and 12 years
- C. 17 and 8 years
- D. 8 and 17 years

15. The masses of a father and daughter differ by 72 and are in the ratio of 8:5. What is the masses of each of them?

- A. 72, 45kg
- B. 82, 45kg
- C. 72, 40kg
- D. 70, 45kg

16. A man drives 146km in a certain average speed. He then increases the speed by 9km/h and takes the same time to travel the next 164km. what was his speed for both parts of the journey?

- A. 73 and 82km/h
- B. 70 and 80km/h
- C. 63 and 82km/h
- D. 73 and 80k/h

17. The sum of three consecutive integers is 147. What are the integers?

- A. 48, 49, 50
- B. 40, 50, 59
- C. 48, 50 51

D. 39, 40, 70

18. Find the first of three consecutive integers if their sum is 420.

A. 139

B. 42

C. 40

D. 400

19. The sum of four consecutive integers is 102. What are the integers?

A. 24, 25, 26, 27

B. 20, 21, 22, 23

C. 23, 24, 25, 26

D. 24, 26, 28, 30

20. What is the largest of three consecutive integers if their sum is 69?

A. 26

B. 7

C. 70

D. 24

21. A car travels 120 km at a certain average speed. Outside the city it travels 72 km at twice its former speed. If the total travel time is 1 h 8 mins. What was the average speed in the city?

A. 45 km/h

B. 55 km/h

C. 35 km/h

D. 50 km/h

22. Solve the equation $\frac{1}{5-x} = \frac{1}{x-3}$

A. 1

B. -2

C. 0

D. 4

23. A man is x years older than his son. The sum of their ages is 65 years. If the son is 16 years old, find x .

A. 49 years

B. 32 years

C. 12 years

D. 32 years

24. What is the sum of 4 and 15?

A. 6

B. 11

C. 8

D. 19

25. Change $4+6$ to words.

A. Difference of four and six

B. Sum of four and six

C. Product of four and six

D. Quotient of four and six

26. Change 9-6 to words.

- A. Positive difference between nine and six
- B. Negative difference between nine and six
- C. Sum of nine and six
- D. Product of nine and six

27. Divide the sum of 11 and 19 by the sum of 21 and 54.

- A. $\frac{3}{7}$
- B. $\frac{2}{5}$
- C. $\frac{1}{4}$
- D. $\frac{7}{11}$

28. Think of a number. If 4 is added to it and the result is divided by 3 we finally have the number 5. What is the number?

- A. 5
- B. 11
- C. 8
- D. 22

29. A school had N1, 000 to spend on a playground. They spent N561 on a new swing and a slide. How much money does the school have left to spend?

- A. N439
- B. N451
- C. N505
- D. N651

E.

30. A city has 3 schools.

- There are 633 students in elementary school
- There are 587 students in middle school
- There are 740 students in high school

What is the total number of students in the 3 schools?

- A. 1,850
- B. 1,860
- C. 1,950
- D. 1,960

31. Kelley made bead necklaces and sold them for N5 each. She earned N40. How many necklaces did Kelley sell?

- A. 6
- B. 8
- C. 35
- D. 45

32. Brad bought 5 sport drinks at the store. He spent a total of N10 on the drinks. How much did each drink cost?

- A. N1.50
- B. N1.75
- C. N2.00
- D. N2.25

33. Pat and Tracy collected a total of 576 aluminum cans. Pat collected 398 aluminum cans. How many did Tracy collect?

A. 178

B. 188

C. 222

D. 288

34. When 72 is divided by the sum of 6 and a certain number, the result is 3. What is the number?

A. 20

B. 19

C. 18

D. 17

35. A certain number is subtracted from 44. The result is divided by 4. The final answer is 8. Find the number.

A. 23

B. 12

C. 14

D. a16

36. One third of the sum of 4 and a certain number is 9. Find the number.

A. 23

B. 8

C. 19

D. 4

37. I think of a number, multiply it by 6 and add 14, the result is 134. What is the number?

- A. 6
- B. 16
- C. 5
- D. 20

38. Find the sum of $2x$ and $3x$

- A. $7x$
- B. $8x$
- C. $5x$
- D. $12x$

39. The sum of two consecutive odd numbers is 24. Find the number.

- A. 11 and 13
- B. 11 and 5
- C. 13 and 7
- D. 10 and 12

40. What is the positive difference between 21 and 8

- A. 5
- B. 13
- C. 7
- D. 14

41. What is the product of $3x$ and $7x$?

A. $12x^2$

B. $17x$

C. $21x^2$

D. $3x^3$

42. Find three quarters of the difference of 15 and 7

A. 6

B. 7

C. 8

D. 9

43. Find one-third of the sum of 2 and 7.

A. 5

B. 3

C. 10

D. 2

44. Find the negative difference between $-9n$ and $-31n$.

A. $22n$

B. $15n$

C. $-22n$

D. $-15n$

45. Find the sum of $\frac{1}{21}$ and the product of $\frac{1}{5}$ and $1\frac{1}{3}$

A. $\frac{33}{105}$

B. $\frac{8}{21}$

C. $\frac{9}{10}$

D. $\frac{3}{17}$

46. Find the difference between the product of 21 and -3 and the sum of 40 and 4.

A. 103

B. -107

C. -103

D. 107

47. Multiply $\frac{1}{5}$ by the sum of 32 and 18

A. 6

B. 9

C. 10

D. 5

48. Find the sum of the product of $1\frac{7}{8}$ and $\frac{1}{12}$ and the product of $3\frac{1}{2}$ and $\frac{5}{6}$

A. $3\frac{7}{96}$

B. $1\frac{1}{2}$

C. $4\frac{1}{207}$

D. $2\frac{1}{11}$

49. Change $7\frac{8}{10}$ to words.

- A. Positive difference between seven and eight
- B. Product of seven and eight
- C. Negative difference between seven and eight
- D. Sum of seven and eight

50. Change 4×6 to words.

- A. Sum of four and six
- B. Difference between six and four
- C. Quotient of six and four
- D. Product of four and six

Solution of the Test Questions (Pretest)

- | | | | | | | | | | | | |
|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|
| 1) | A | 2) | C | 3) | B | 4) | D | 5) | D | 6) | B |
| 7) | D | 8) | A | 9) | A | 10) | C | 11) | B | 12) | A |
| 13) | A | 14) | C | 15) | A | 16) | D | 17) | A | 18) | A |
| 19) | A | 20) | D | 21) | B | 22) | D | 23) | A | 24) | D |
| 25) | B | 26) | A | 27) | B | 28) | B | 29) | A | 30) | D |
| 31) | B | 32) | C | 33) | A | 34) | C | 35) | B | 36) | A |
| 37) | D | 38) | C | 39) | A | 40) | B | 41) | C | 42) | A |
| 43) | B | 44) | C | 45) | A | 46) | B | 47) | C | 48) | A |
| 49) | C | 50) | D | | | | | | | | |

APPENDIX B

Post-Algebraic Word Problems Performance Test

Post-Algebraic Word Problems Performance Test

Instructions: Select from A – D the correct answer of the questions. You are to answer all the questions which carry equal marks.

Time allowed 1 ½ hours

- $\frac{7}{8}$ of a certain amount of money is ₦56. How much is the money?
A. ₦78 B. ₦86 C. ₦84 D. ₦64
- The difference between two numbers is 457, if the smaller number is 610, what is the larger number?
A. 930 B. 1089 C. 1299 D. 1067
- Four of the 22 players playing a game are sent out. What fraction of the players is left?
A. $\frac{1}{11}$ B. $\frac{2}{9}$ C. $\frac{2}{11}$ D. $\frac{7}{9}$
- How many air tickets can ₦3950.00 buy if each costs ₦25.00
A. 258 B. 160 C. 158 D. 168
- What is the value of x in the equation $\frac{36}{x} = \frac{6}{5}$?
A. 6 B. 30 C. 36 D. 90
- If $x - 13 = 18$, what is the value of x ?
A. 37 B. 31 C. 13 D. 5
- If $2n - 3 = 5$, what is the value of n ?
A. 4 B. 1 C. 8 D. 0
- Subtract the difference between 10.76 and 20.88 from the sum of the two numbers.
A. 21.52 B. 53.67 C. 31.64 D. 67.21
- Air force primary school Ilorin has a population of 1530 pupils, 21 pupils were absent on a certain day. Out of the number present, 683 were girls, how many boys were present?
A. 672 B. 1209 C. 847 D. 826
- Sam's mother gives him ₦60 and his father gives him ₦150 on his birthday. He buys a remote controlled car for ₦40.50. How much money is left with him?
A. ₦50.50 B. ₦160.50 C. ₦70.00 D. ₦169.50
- Find the product of 10 and 6, subtract 24 and divide the result by 4.
A. 3 B. 7 C. 9 D. 8
- Write Numeral 60080014 in words
A. Six hundred and eight thousand and fourteen
B. Six hundred and eighty thousand and fourteen
C. Sixty million and eighty thousand and fourteen

- D. Sixty thousand and eight hundred and fourteen
13. If $a = 2$, $b = 4$ find the value of $4a + 36$
A. 12 B. 20 C. 16 D. 7
 14. What is the value of y if $\frac{y}{4} = \frac{24}{6}$
A. 12 B. 16 C. 48 D. 6
 15. A ball-point pen cost ₦15. How many of the pens can be bought for ₦300?
A. 20 B. 10 C. 7 D. 3
 16. There are 420 pupils in a school. If $\frac{3}{5}$ are boys, how many are girls?
A. 252 B. 168 C. 170 D. 238
 17. The average age of 28 primary five pupils is 11 years. What is the sum of their ages?
A. 39 years B. 78 years C. 390 years D. 308 years
 18. Find the difference between (three hundred and three) and (two thousand and seventy six)
A. 3771 B. 237 C. 2379 D. 1773
 19. Find the product of 89.73 and 0.0010
A. 8973 B. 879.3 C. 0.08973 D. 8.973
 20. In a school of 105 pupils the boys are 25 more than the girls. How many boys are there in the school?
A. 55 B. 65 C. 45 D. 40
 21. When Ugo was 15 years old his sister Chinwe was 11 years old. If Ugo was born in 1900 in which was Chinwe born
A. 1896 B. 1904 C. 1994 D. 1897
 22. Find the product of 8.02 and 6.1 and correct your answer to the nearest whole number.
A. 49 B. 48 C. 50 D. 14
 23. What is the smallest number that can be divided exactly by 6 and 7?
A. 42 B. 21 C. 49 D. 56
 24. Divide the L.C.M of 12 and 15 by their H.C.F
A. 21 B. 40 C. 60 D. 20
 25. From maize, yam, cocoa and kola nut a farmer earned ₦302, ₦1205, ₦670 and ₦3350 respectively. How much has he altogether from the sales?
A. ₦6627 B. ₦7006 C. ₦7267 D. ₦5527
 26. The population of a secondary school is 876, if a student pays ₦528.00 per session how much had the school realized per session?
A. ₦7008 B. ₦8760 C. ₦462528 D. ₦17520
 27. If $2(p + 3) = 18$, find the value of p .
A. 2 B. 4 C. 6 D. 8
 28. If the cost of 8 bottles of fruit juice is ₦640 and that of 5 bottles of tonic wine is ₦905 respectively, what is the total cost of bottles of fruit juice and 2 bottles of tonic wine?
A. ₦1545 B. ₦362 C. ₦265 D. ₦1002
 29. Twelve ball pens cost ₦158.40, what is the cost of one ball pen?
A. ₦26.40 B. ₦39.60 C. ₦66.00 D. ₦13.20

30. If I had ₦2340 and I gave $\frac{2}{3}$ of the amount to my friend and half of the remainder to my brother, how much do I have left?
 A. ₦780.00 B. ₦1560.00 C. 1170.00 D. ₦195.00
31. A boy arrived at school at 8:15am. If he stayed in school for 4hrs 20minutes, when did he leave?
 A. 11:15am B. 12:05pm C. 12:35pm D. 1:15pm
32. The sum of two numbers is 64. One of the numbers is three times the other. Find the two numbers
 A. 14,18 B. 12,38 C. 16,48 D. 18,36
33. A filling station has only 123.5 liters of petrol left in its tank. This is shared equally among 13 customers. How many liters of petrol will each customer have?
 A. 9.5 ltrs B. 13 ltrs C. 6.7 ltrs D. 8.7 ltrs
34. Change $3 + 7$ to words
 A. Difference of three and seven
 B. Sum of three and seven
 C. Product of three and seven
 D. Quotient of three and seven
35. Change $6 - 5$ to words.
 A. Positive difference between six and five
 B. Negative difference between six and five
 C. Sum of nine and six
 D. Product of nine and six
36. The sum of two consecutive odd numbers is 24. Find the numbers
 a. 11 and 5
 b. 11 and 13
 c. 13 and 7
 d. 10 and 12
37. What is the positive difference between 21 and 8?
 A. 5 B. 13 C. 7 D. 14
38. What is the product of $3x$ and $7x$
 A. $12x^2$
 B. $17x^2$
 C. $21x^2$
 D. $3x^2$
39. Find three quarters of the difference of 15 and 7
 A. 7 B. 8 C. 9 D. 6
40. What is one-third of the sum of 2 and 7?
 A. 5 B. 3 C. 10 D. 2
41. Change 2×4 to words
 A. Sum of two and four
 B. Difference of two and four
 C. Quotient of two and four
 D. Product of two and four
42. Find the sum of the product of $1\frac{7}{8}$ and $\frac{2}{12}$ and the product of $3\frac{1}{2}$ and $\frac{3}{6}$
 A. $1\frac{15}{16}$ B. $2\frac{1}{16}$ C. $3\frac{12}{21}$ D. $1\frac{1}{16}$

43. Multiply $\frac{1}{3}$ by the sum of 2 and 1.
A. 5 B. 6 C. 1 D. 3
44. A certain number is subtracted from 42. The result is divided by 2. The final answer is 6. Find the number
A. 40 B. 15 C. 35 D. 30
45. The sum of three consecutive integers is 12. What are the integers?
A. 3, 4, 5 B. 3, 4, 7 C. 2, 6, 3 D. 1, 5, 7
46. A brother is 3 years older than his sister. 5 years ago, the ratio of their ages was 4:3. Their present ages are?
A. 17 and 13 years
B. 14 and 12 years
C. 17 and 8 years
D. 8 and 17 years
47. Number greater than x is
A. $x + 3$
B. $\frac{1}{x}$
C. $3 - x$
D. $x - 3$
48. Express the statement as algebraic equations “the result of taking 2 from y and multiplying the result by 4 is the same as multiplying y by 3 and taking away 5.
A. $4(y - 2) = 5(y - 3)$
B. $4(y - 2) = 3y - 5$
C. $4(y - 2) = 5 - 3y$
D. $4(2 - y) = -2y$
49. Last year a football player scored 10 points. This year he has scored 7 points. How many points must he score to have the same points as last year?
A. 5 B. 6 C. 3 D. 17
50. There are 30 students waiting to have their school pictures taken. Each picture takes three minutes. What is the total number of minutes it will take for all these to have their picture taken?
A. 10 minutes
B. 12 minutes
C. 45 minutes
D. 90 minutes

Solution for AWPPT

1. D 2. D 3. C 4. C 5. B 6. B 7. A 8. A 9. D 10. D

11. C 12. C 13. B 14. B 15. A 16. A 17. D 18. D 19. C 20. B

21. B 22. A 23. A 24. D 25. D 26. C 27. C 28. D 29. D 30. A

31. C 32. C 33. A 34. B 35. A 36. B 37. B 38. C 39. D 40. B

41. D 42. A 43. C 44. D 45. A 46. C 47. A 48. B 49. C 50. D

APPENDIX C
Post-post-Algebraic Word Problems Performance Test

Instructions: Select from A – D the correct answer of the questions. You are to answer all the questions which carry equal marks.

Time allowed 1 ½ hours

1. There are 30 students waiting to have their school pictures taken. Each picture takes three minutes. What is the total number of minutes it will take for all these to have their picture taken?
A. 10 minutes
B. 12 minutes
C. 90 minutes
D. 45 minutes
2. Last year a football player scored 10 points. This year he has scored 7 points. How many points must he score to have the same points as last year?
A. 5 B. 3 C. 6 D. 17
3. The difference between two numbers is 457, if the smaller number is 610, what is the larger number?
A. 1067 B. 1089 C. 1299 D. 930
4. Change $6 - 5$ to words.
A. Sum of nine and six
B. Negative difference between six and five
C. Positive difference between six and five
D. Product of nine and six
5. Find three quarters of the difference of 15 and 7
A. 7 B. 6 C. 9 D. 8
6. Four of the 22 players playing a game are sent out. What fraction of the players is left?
A. $\frac{2}{11}$ B. $\frac{2}{9}$ C. $\frac{1}{11}$ D. $\frac{7}{9}$
7. How many air tickets can ₦3950.00 buy if each costs ₦25.00
A. 258 B. 160 C. 168 D. 158
8. What is the value of x in the equation $\frac{36}{x} = \frac{6}{5}$?
A. 30 B. 6 C. 36 D. 90
9. If $x - 13 = 18$, what is the value of x ?
A. 37 B. 5 C. 13 D. 31
10. If $2n - 3 = 5$, what is the value of n ?
A. 8 B. 1 C. 4 D. 0
11. Subtract the difference between 10.76 and 20.88 from the sum of the two numbers.
A. 53.67 B. 21.52 C. 31.64 D. 67.21

12. Air force primary school Ilorin has a population of 1530 pupils, 21 pupils were absent on a certain day. Out of the number present, 683 were girls, how many boys were present?
A. 826 B. 1209 C. 847 D. 672
13. Sam's mother gives him ₦60 and his father gives him ₦150 on his birthday. He buys a remote controlled car for ₦40.50. How much money is left with him?
A. ₦50.50 B. ₦160.50 C. ₦169.50 D. ₦70.00
14. Find the product of 10 and 6, subtract 24 and divide the result by 4.
A. 3 B. 7 C. 8 D. 9
15. Write Numeral 60080014 in words
A. Sixty million eighty thousand and fourteen
B. Six hundred and eighty thousand and fourteen
C. Six hundred and eight thousand and fourteen
D. Sixty thousand and eight hundred and fourteen
16. If $a = 2$, $b = 4$ find the value of $4a + 3b$
A. 12 B. 16 C. 20 D. 7
17. What is the value of y if $\frac{y}{4} = \frac{24}{6}$
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A. 1896 B. 1994 C. 1904 D. 1897
25. Find the product of 8.02 and 6.1 and correct your answer to the nearest whole number.
A. 48 B. 49 C. 50 D. 14
26. What is the smallest number that can be divided exactly by 6 and 7?
A. 56 B. 21 C. 49 D. 42
27. Divide the L.C.M of 12 and 15 by their H.C.F
A. 20 B. 40 C. 60 D. 21
28. From maize, yam, cocoa and kola nut a farmer earned ₦302, ₦1205, ₦670 and ₦3350 respectively. How much has he altogether from the sales?
A. ₦6627 B. ₦7006 C. ₦5527 D. ₦7267

29. The population of a secondary school is 876, if a student pays ₦528.00 per session how much had the school realized per session?
 A. ₦462528 B. ₦8760 C. ₦7008 D. ₦17520
30. $\frac{7}{8}$ of a certain amount of money is ₦56. How much is the money?
 A. ₦78 B. ₦64 C. ₦84 D. ₦86
31. If $2(p + 3) = 18$, find the value of p.
 A. 6 B. 4 C. 2 D. 8
32. If the cost of 8 bottles of fruit juice is ₦640 and that of 5 bottles of tonic wine is ₦905 respectively, what is the total cost of bottles of fruit juice and 2 bottles of tonic wine?
 A. ₦1545 B. ₦362 C. ₦1002 D. ₦265
33. Twelve ball pens cost ₦158.40, what is the cost of one ball pen?
 A. ₦26.40 B. ₦39.60 C. ₦66.00 D. ₦13.20
34. If I had ₦2340 and I gave $\frac{2}{3}$ of the amount to my friend and half of the remainder to my brother, how much do I have left?
 A. ₦780.00 B. ₦1560.00 C. 1170.00 D. ₦195.00
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37. A filling station has only 123.5 liters of petrol left in its tank. This is shared equally among 13 customers. How many liters of petrol will each customer have?
 A. 9.5 ltrs B. 13 ltrs C. 6.7 ltrs D. 8.7 ltrs
38. Change $3 + 7$ to words
 A. Difference of three and seven
 B. Sum of three and seven
 C. Product of three and seven
 D. Quotient of three and seven
39. The sum of two consecutive odd numbers is 24. Find the numbers
 A. 11 and 5
 B. 11 and 13
 C. 13 and 7
 D. 10 and 12
40. What is the positive difference between 21 and 8?
 A. 5 B. 13 C. 7 D. 14
41. What is the product of $3x$ and $7x$
 A. $12x^2$
 B. $21x^2$
 C. $17x$
 D. $3x^2$
42. What is one-third of the sum of 2 and 7?
 A. 5 B. 10 C. 3 D. 2
43. Change 2×4 to words
 A. Product of two and four

- B. Difference of two and four
 C. Quotient of two and four
 D. Sum of two and four
44. Find the sum of the product of $1\frac{7}{8}$ and $\frac{2}{12}$ and the product of $3\frac{1}{2}$ and $\frac{3}{6}$
 A. $2\frac{1}{16}$ B. $1\frac{15}{16}$ C. $3\frac{12}{21}$ D. $1\frac{1}{16}$
45. Multiply $\frac{1}{3}$ by the sum of 2 and 1.
 A. 1 B. 6 C. 5 D. 3
46. A certain number is subtracted from 42. The result is divided by 2. The final answer is 6. Find the number
 A. 40 B. 30 C. 35 D. 15
47. The sum of three consecutive integers is 12. What are the integers?
 A. 1, 5, 7 B. 3, 4, 7 C. 2, 6, 3 D. 3, 4, 5
48. A brother is 3 years older than his sister. 5 years ago, the ratio of their ages was 4:3. Their present ages are?
 A. 17 and 8 years
 B. 14 and 12 years
 C. 17 and 13 years
 D. 8 and 17 years
49. Number greater than x is
 A. $x - 3$
 B. $\frac{1}{x}$
 C. $3 - x$
 D. $x + 3$
50. Express the statement as algebraic equations “the result of taking 2 from y and multiplying the result by 4 is the same as multiplying y by 3 and taking away 5.
 A. $4(y - 2) = 5(y - 3)$
 B. $4(y - 2) = 5 - 3y$
 C. $4(y - 2) = 3y - 5$
 D. $4(2 - y) = -2y$

Solution for AWPRT

1. C 2. B 3. A 4. C 5. B 6. A 7. D 8. A 9. D 10. C

11. B 12. A 13. C 14. D 15. A 16. C 17. D 18. C 19. B 20. A

21. C 22. B 23. A 24. C 25. B 26. D 27. A 28. C 29. A 30. B

31. A 32. C 33. D 34. C 35. C 36. C 37. A 38. B 39. B 40. B

41. B 42. C 43. A 44. B 45. A 46. B 47. D 48. A 49. D 50. C

APPENDIX D
TEST SCORES OF PILOT STUDY

S/NO	TEST SCORE	RETEST SCORE
1.	16	18
2.	30	28
3.	18	20
4.	24	30
5.	12	10
6.	08	12
7.	14	14
8.	38	40
9.	06	10
10.	20	26
11.	08	06
12.	30	28
13.	18	22
14.	42	36
15.	44	50
16.	16	24
17.	02	06
18.	04	10
19.	48	44
20.	06	08
21.	08	12
22.	18	16
23.	42	48
24.	14	10
25.	20	28
26.	10	12
27.	12	18
28.	50	48
29.	38	30
30.	36	40
31.	04	02
32.	52	50
33.	06	04
34.	54	56
35.	34	38
36.	42	46
37.	46	44
38.	30	36
39.	32	38
40.	34	40

APPENDIX E

Reliability Test Table

CORRELATIONS

/VARIABLES=Test Retest
/PRINT=TWOTAIL NOSIG
/MISSING=PAIRWISE.

Correlations

		Test	Retest
Test	Pearson Correlation	1	.814**
	Sig. (2-tailed)		.000
	N	40	40
Retest	Pearson Correlation	.814**	1
	Sig. (2-tailed)	.000	
	N	40	40

** . Correlation is significant at the 0.01 level (2-tailed).

APPENDIX F

Manual for Experimental Group (Learning Package Documentation)

System Requirement

Operating system: Windows Vista, Windows 7 and Windows 8.

System type: 32 bit or 64 bit

RAM: 1.0 GB or higher.

Software requirement

Microsoft Office PowerPoint versions 2007, 2010 and 2013.

User manual.

The package is designed using Microsoft Office PowerPoint 2007 and saved as such. Each file is read only. The following steps should be followed in order to enjoy the content of the package.

- Double click on the file.
- Click on **Read Only** on the dialogue box displayed.

The file is opened on Microsoft PowerPoint. User can scroll through the slide via the slide navigation pane. The content can be properly shown by following the steps below:

- On the **Ribbon**, click on **Slide Show**
- Locate and click **From Beginning** button
- Continue to click to display the content one after the other.

Where the audiences are large in number, connect your computer to an overhead projector.

To close the file, select the close button on the **control buttons**.

APPENDIX G
LESSON PLAN FOR EXPERIMENTAL GROUP (CBI)
Lesson 1

School: J.G.S.S Manchok

Group: Group A for experimental group

Duration: 45 Minutes

Sex: Mixed

Subject: Mathematics

Topic: Algebraic Word Problems

Previous Knowledge: Students have mastered how to add, subtract and multiply numbers and write them in words.

Teaching Aids: Projector, Blackboard, Chalk and Duster

Teaching Approach: Computer Based Instruction approach

Objective(s): At the end of the lesson students should be able to:

1. Express word problems in numerical terms.
2. Formulate word problems from numerical expressions.

LESSON DEVELOPMENT/PRESENTATION

Stages and Time	Teacher Role (Teaching Activity)	Expected Student Activity (Learning Points)
Mode of operating the computer 10 minutes	Teacher guide the students on how to operate the computer	<ol style="list-style-type: none"> i. Press the “on” key and observe the display file(lesson on algebraic word problems) ii. Double click on the file(lesson on algebraic word problems) iii. Click on Read only on the dialogue displayed iv. On the Ribbon, click on slide show v. Locate and click from beginning button vi. Continue to click to display the content of algebraic word problems one after the other.
Introduction 5 minutes	<ol style="list-style-type: none"> i. Write 3-2 in words ii. Write the sum of seven and eight in numeric form 	<ol style="list-style-type: none"> i. The positive difference between three and two ii. $7+8$

<p>Presentation 10 minutes</p>	<p>Example 1</p> <p>Write the word problem in numerical form</p> <p>i. Take away two from the sum of thirty five and sixteen</p> <p>The Teacher guide the students to approach the problem step by step</p>	<p>Step i: The Teacher shows how to write two, thirty five and sixteen in numeric form</p> <p>2, 35, and 16</p> <p>Step ii: The Teacher write the sum of 35 and 16</p> <p>i.e $35+16$</p> <p>Step iii: The Teacher then find the difference between 2 and $35+16$</p> <p>i.e $(35+16)-2$</p>
<p>Presentation 10 minutes</p>	<p>Example 2</p> <p>Change $\frac{(5+8)-3}{2}$ to word problem.</p> <p>The Teacher break the word problem to concrete situation.</p>	<p>Step i: Teacher explain the concept of addition as bringing together, subtraction as taking away and division as sharing.</p> <p>Step ii: Teacher use the names of some of the students to formulate the word problem. i.e Bola has five oranges and Sule has eight oranges, they put their oranges together, gave three to their friend Abdullahi and share the rest equally between them.</p>
<p>Evaluation 10 minutes</p>	<p>The Teacher evaluates the lesson by asking the students</p>	<p>Exercise:</p> <p>1. Write Ibrahim added thirteen</p>

	<p>questions based on what has been taught and giving the students class work to measure the success or failure of the lesson</p>	<p>rocks to his collection of forty nine rocks in numerical expression.</p> <p>2. Formulate word problem from $(30-8)+2$</p>
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Conclusion: The Teacher concludes the lesson by briefly explaining the main points of the lesson and allowing the students to ask questions based on what has been taught in the class.

Lesson 2

School: J.G.S.S Manchok

Group: Group A for experimental group

Duration: 45 Minutes

Sex: Mixed

Subject: Mathematics

Topic: Word problems in sum and difference.

Previous Knowledge: Students have learned how to translate word problems into numerical expression and vice versa.

Teaching Aids: Projector, Blackboard, Chalk and Duster

Teaching Approach:Computer Based-Instruction approach

Objective(s):At the end of the lesson, the students should be able to solve word problems on sum and difference of whole numbers.

LESSON DEVELOPMENT/PRESENTATION

Stages and Time	Teacher Role (Teaching Activity)	Expected Student Activity (Learning Points)
Mode of operating the computer 10 minutes	Teacher guide the students on how to operate the computer	<ol style="list-style-type: none">i. Press the “on” key and observe the display file(lesson on algebraic word problems)ii. Double click on the file(lesson on algebraic word problems)iii. Click on Read only on the dialogue displayediv. On the Ribbon, click on slide showv. Locate and click from beginning buttonvi. Continue to click to display the content of algebraic word problems one after the other.

<p>Introduction</p> <p>5 minutes</p>	<p>Formulate word problem</p> <p>from $\frac{(3+8)-4}{2}$</p>	<p>Musa has three apples and Sunday has eight, they put their apples together, gave four to their friend Bola and share the rest equally between them.</p>
<p>Presentation</p> <p>10 minutes</p>	<p>Example 1</p> <p>The sum of four consecutive numbers is 58. Find the number.</p> <p>Teacher guide the students by asking what the numbers are?</p>	<p>Step i: Let the numbers be n, n+1, n+2, n+3.</p> <p>Step ii: The Teacher guide the students to add the numbers and equate to 58.</p> $n+(n+1)+(n+2)+(n+3)=58$ <p>Step iii: The Teacher guide the students to carry out the simplification</p> $n+n+n+n+1+2+3=58$ $4n=58-6$ $\frac{4n}{4} = \frac{52}{4}$ <p>n=13</p> <p>Hence the numbers are 13, 14, 15 and 16.</p>
<p>Presentation</p> <p>10 minutes</p>	<p>Example 2</p> <p>The difference between eight and another number is seventeen. Find the possible value for the number.</p>	<p>Step i: Let the number be y</p> $y-8=17$ <p>Step ii: Teacher guide the students on how to find the unknown variable y by adding 8 to both sides of the equation.</p>

	Teacher explain to the students that the number should be assume.	$y-8+8=17+8$ $y=25$ the possible value is 25.
Evaluation 10 minutes	The Teacher evaluates the lesson by asking the students questions based on what has been taught and give the students assignment.	Assignment 1. The sum of four odd numbers is eighty. Find the numbers 2. The difference between negative three and a number is eight. Find the number.

Lesson 3

School: J.G.S.S Manchok

Group:Group A for experimental group

Duration: 45 Minutes

Sex: Mixed

Subject:Mathematics

Topic: Word Problems on product and quotient of whole numbers.

Previous Knowledge:Students have already learned how to solve word problems on sum and difference of whole numbers.

Teaching Aids:Projector, Blackboard, Chalk and Duster

Teaching Approach:Computer Based -Instruction approach

Objective(s):At the end of the lesson, students should be able to solve word problems on the product and quotient of whole numbers.

LESSON DEVELOPMENT/PRESENTATION

Stages and Time	Teacher Role (Teaching Activity)	Expected Student Activity (Learning Points)
Mode of operating the computer 10 minutes	Teacher guide the students on how to operate the computer	<ol style="list-style-type: none">i. Press the “on” key and observe the display file(lesson on algebraic word problems)ii. Double click on the file(lesson on algebraic word problems)iii. Click on Read only on the dialogue displayediv. On the Ribbon, click on slide showv. Locate and click from beginning buttonvi. Continue to click to display the content of algebraic word problems one after the

		other.
Introduction 5 minutes	<ol style="list-style-type: none"> 1. What is the sum of 12 and 9? 2. Sadiya was given 42 groundnuts by her friends. She gave 20 of them to her brother Faisal. How many nuts does Sadiya have left? 	$12+9=21$ She has $(42-20)$ groundnuts left. She has 22 groundnuts left.
Presentation 10 minutes	Teacher investigate the question with the students. Example <ol style="list-style-type: none"> 1. Musa had five sweets in his school bag, Mummy promised to give him three times the quantity if he gets full marks in his English test, Musa got 10/10 in his English test, so Mummy kept her 	Step i: Teacher guide their thinking by asking questions, giving occasional units, make them relate to known ideas, which required reasons. Ask questions that demand students' participation such as how many sweets did Musa get? Step ii: Mummy gave Musa (5×3) sweets. Therefore Mummy gave Musa 15 sweets.

	word. How many sweets did Mummy give Musa on his return from school?	
Presentation 10 minutes	Example 2 Yesterday was Mrs. Ojo's birthday. She bought 32 sweets to share them among her 4 children. How many did she give each child?	Step i: Teacher put the students through by asking leading questions such as: How many sweets did Mrs. Ojo buy? How many children does she have? Step ii: She gave each child $\left(\frac{32}{4}\right)$ sweets Each child get 8 sweets.
Evaluation 10 minutes	The Teacher evaluates the lesson by asking the students questions based on what has been taught and give the students class work to measure the success or failure of the lesson	Exercise: 1. If I divide a number by three, I got twenty nine as the answer, what number did I divide by three? 2. Maryam and Isa have eighty two groundnuts between them, and Isa has 4 more than Maryam. How many has Isa?

Conclusion: The Teacher concludes the lesson by briefly explaining the lesson and allow students to ask questions.

Lesson 4

School: J.G.S.S Manchok

Group: Group A for experimental group

Duration: 45 Minutes

Sex: Mixed

Subject: Mathematics

Topic: The combination of product with sums and difference in word problems

Previous Knowledge: Students have learned how to solve word problems with the products and quotient of whole numbers.

Teaching Aids: Projector, Blackboard, Chalk and Duster

Teaching Approach: Computer Based Instruction approach

Objective: The students should be able to solve the word problems combining products with sum and difference.

LESSON DEVELOPMENT/PRESENTATION

Stages and Time	Teacher Role (Teaching Activity)	Expected Student Activity (Learning Points)
Mode of operating the computer	Teacher guide the students on how to operate the computer	i. Press the “on” key and observe the display file(lesson on algebraic

10 minutes		<p>word problems)</p> <ul style="list-style-type: none"> ii. Double click on the file(lesson on algebraic word problems) iii. Click on Read only on the dialogue displayed iv. On the Ribbon, click on slide show v. Locate and click from beginning button vi. Continue to click to display the content of algebraic word problems one after the other.
Introduction 5 minutes	<ul style="list-style-type: none"> i. What is the product of six and three ii. A number is divided by 2, the result is 7. What is the number? 	<ul style="list-style-type: none"> i. Teacher guide the students toward the meaning of product. Product means multiplication. Hence $6 \times 3 = 18$ ii. Let the number be x $\frac{x}{2} = 7$ Cross multiply $x = 2 \times 7$

		$x=14$ the number is 14
Presentation 10 minutes	Example 1 i. Find the sum of 0.9 and the product of 1.7 and 3	Step i: Product of 1.7 and 3 $1.7 \times 3 = 5.1$ Step ii: Sum of 0.9 and 5.1 $= 0.9 + 5.1$ $= 6.0$
Presentation 10 minutes	Example 2 Find the positive difference between the sum of 1.6 and 2 and the product of 7 and 0.4	Step i: Sum of 1.6 and 2 $1.6 + 2 = 3.6$ Step ii: Product of 7 and 0.4 7×0.4 $= 2.8$ Step iii: Positive difference between 3.6 and 2.8 $3.6 - 2.8$ $= 0.8$
Evaluation 10 minutes	The Teacher evaluates the lesson by asking the students questions based on what has been taught and give the students class work to measure the success or failure of the lesson	Exercise: Find the product of $\frac{1}{7}$ and the sum of $\frac{3}{5}$ and $1\frac{1}{2}$.

Conclusion:The Teacher concludes the lesson by briefly explaining the main points of the lesson and allow the students to ask questions based on what has been taught in the class.

Lesson 5

School: J.G.S.S Manchok

Group:Group A for experimental group

Duration: 45 Minutes

Sex: Mixed

Subject:Mathematics

Topic: Word Problems involving fractions

Previous Knowledge:Students have learned how to add and subtract fractions

Teaching Aids:Projector, Blackboard, Chalk and Duster

Teaching Approach:Computer Based Instruction approach

Objective:At the end of the lesson, the students should be able to solve and simplify word problems involving fractions.

LESSON DEVELOPMENT/PRESENTATION

Stages and Time	Teacher Role (Teaching Activity)	Expected Student Activity (Learning Points)
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<p>Mode of operating the computer 10 minutes</p>	<p>Teacher guide the students on how to operate the computer</p>	<ol style="list-style-type: none"> i. Press the “on” key and observe the display file(lesson on algebraic word problems) ii. Double click on the file(lesson on algebraic word problems) iii. Click on Read only on the dialogue displayed iv. On the Ribbon, click on slide show v. Locate and click from beginning button vi. Continue to click to display the content of algebraic word problems one after the other.
<p>Introduction 5 minutes</p>	<ol style="list-style-type: none"> 1. What is one tenth of the sum of 5 and 8? 2. Find one ninth of the difference between the sum of 2 and 7 and a number 3 	<ol style="list-style-type: none"> 1. $\frac{5+8}{10}$ 2. $\frac{(2+7)-3}{9}$

<p>Presentation</p> <p>10 minutes</p>	<p>Example 1</p> <p>1. In a family of eight, one-eighth of the members are very tall and quarter of them are very short. The rest are of average height. How many are of average heights in that family?</p>	<p>Step i: Teacher ask the students one-eighth of eight and quarter of eight.</p> <p>$\frac{1}{8}$ of 8=1</p> <p>$\frac{1}{4}$ of 8=2</p> <p>Step ii: 8-(1+2)</p> <p>8-(3)</p> <p>8-3=5</p> <p>5 are of average heights in that family.</p>
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<p>Presentation</p> <p>10 minutes</p>	<p>Example 2</p> <p>2. What is greater than half of 7 by 11?</p>	<p>Step i: Let the number be x.</p> <p>Teacher ask the students what is half of 7.</p> <p>Step ii:</p> $x - \frac{7}{2} = 11$ <p>Add $\frac{7}{2}$ to both sides</p> $x - \frac{7}{2} + \frac{7}{2} = 11 + \frac{7}{2}$ $x = 11 + \frac{7}{2}$ $x = \frac{29}{2}$ $x = 14\frac{1}{2}$ <p>The number is $14\frac{1}{2}$</p>
<p>Evaluation</p> <p>10 minutes</p>	<p>The Teacher evaluates the lesson by asking the students questions based on what has been taught and give the students class work to measure the success or failure of the lesson</p>	<p>Exercise:</p> <ol style="list-style-type: none"> 1. Find the quarter of the difference between 17 and the square of 3 2. Find one-third of the product of 12 and 15

Lesson 6

School: J.G.S.S Manchok

Group: Group A for experimental group

Duration: 45 Minutes

Sex: Mixed

Subject: Mathematics

Topic: More word problems involving simple algebraic fractions

Previous Knowledge: Students have learned how to solve word problems involving simple algebraic fractions.

Teaching Aids: Projector, Blackboard, Chalk and Duster

Teaching Approach: Computer Based Instruction approach

Objective: At the end of the lesson, students should be able to solve word problems involving simple algebraic fractions

LESSON DEVELOPMENT/PRESENTATION

Stages and Time	Teacher Role (Teaching Activity)	Expected Student Activity (Learning Points)
Mode of operating the computer 10 minutes	Teacher guide the students on how to operate the computer	i. Press the “on” key and observe the display file(lesson on algebraic word problems)

		<p>ii. Double click on the file(lesson on algebraic word problems)</p> <p>iii. Click on Read only on the dialogue displayed</p> <p>iv. On the Ribbon, click on slide show</p> <p>v. Locate and click from beginning button</p> <p>vi. Continue to click to display the content of algebraic word problems one after the other.</p>
<p>Introduction 5 minutes</p>	<p>i. Find one ninth of the difference between 49 and 13</p> <p>ii. Find one-eighth of the sum of 14,15 and 19</p>	<p>i. $\frac{1}{9}(49-13)$</p> <p>$\frac{1}{9} \times 36 = 4$</p> <p>$\frac{1}{8}(14+15+19)$</p> <p>$= \frac{1}{8} \times 48 = 6$</p>
<p>Presentation 10 minutes</p>	<p>Example 1 The average cost of a number of pencils is 50k, if all the</p>	<p>Step i: Teacher guide the students to consider the un known, choose letter to represent the unknown and write the</p>

	<p>pencils cost ₦20. Find the total number of pencils</p>	<p>statement into an equation form.</p> <p>Let the number of pencils be x</p> <p>Average cost of pencil = $\frac{20}{x}$</p> <p>Convert to kobo</p> <p>$\frac{20}{x} = \frac{20}{x} \times 100$</p> <p>Hence $50 = \frac{20 \times 100}{x}$</p> <p>Step ii: Teacher guide the student to solve the equation so that they can find the unknown value of x</p> $50 = \frac{20 \times 100}{x}$ <p>Multiply both sides by x</p> $50x = 2000$ <p>Divide both sides by 50</p> $\frac{50x}{50} = \frac{2000}{50}$ <p>X=40</p> <p>The total number of pencils is 40.</p>
<p>Presentation 10 minutes</p>	<p>Example 2</p> <p>The weight of a certain group of boys is 1200kg. If the average weight is 40kg, find the number of boys.</p>	<p>Step i: Let the number of boys be n</p> <p>Total weight=1200kg</p> <p>Then average weight = $\frac{1200}{n}$</p> $40 = \frac{1200}{n}$ <p>Step ii. Teacher guide the students to</p>

		<p>solve the equation and find n</p> $40n=1200$ <p>Divide both sides by 40</p> $\frac{40n}{40} = \frac{1200}{40}$ <p>n=30 boys</p>
<p>Evaluation 10 minutes</p>	<p>The Teacher evaluates the lesson by asking the students questions based on what has been taught to them.</p>	<p>Exercise: A man buys a shirt each for his sons at a total cost of ₦32. If the average cost is ₦4, how many sons does the man have?</p>

Conclusion:The Teacher concludes the lesson by briefly explaining the main points of the lesson and allowing the students to ask questions based on what has been taught in the class.

Lesson 7

School:J.G.S.S Manchok

Group:Group A for experimental group

Duration: 45 Minutes

Sex: Mixed

Subject:Mathematics

Topic: Algebraic Functions

Previous Knowledge: The Students have learned how to solve simple equations

Teaching Aids: Projector, Blackboard, Chalk and Duster

Teaching Approach: Computer Based Instruction approach

Objective: At the end of the lesson, students should be able to solve more difficult problems involving Fractional algebraic equations.

LESSON DEVELOPMENT/PRESENTATION

Stages and Time	Teacher Role (Teaching Activity)	Expected Student Activity (Learning Points)
Mode of operating the computer 10 minutes	Teacher guide the students on how to operate the computer	<ol style="list-style-type: none">i. Press the “on” key and observe the display file(lesson on algebraic word problems)ii. Double click on the file(lesson on algebraic word problems)iii. Click on Read only on the dialogue displayediv. On the Ribbon, click on

		<p>slide show</p> <p>v. Locate and click from beginning button</p> <p>vi. Continue to click to display the content of algebraic word problems one after the other.</p>
<p>Introduction</p> <p>5 minutes</p>	<p>Solve the equation</p> <p>i. $2x + 5 = 1$</p>	<p>i. $2x + 5 = 1$</p> <p>Subtract 5 from both sides of the equation</p> $2x + 5 - 5 = 1 - 5$ $2x = -4$ <p>Divide both sides by 2</p> $\frac{2x}{2} = \frac{-4}{2}$ $x = -2$
<p>Presentation</p> <p>10 minutes</p>	<p>Example 1</p> <p>A certain car covers 10km at a certain average speed. If this average speed is reduced by 30km/h, the car takes the same amount of time to cover a distance of 6km. find</p>	<p>Step i: The Teacher leads the students to identify essential statement, then translate the statements into symbolic statements. Let the speed for the first part = akm/h</p> <p>\therefore the speed of the second part = $\frac{(a-30)km}{h}$</p>

the speed of the car in the first part of the journey.

Time taken by first car to cover $10\text{km} = 10/ah$

Time taken by second car to cover 6km .

$$6\text{km} = \frac{6\text{km}(a - 30)}{h}$$

The times are the same in both journey

$$\therefore \frac{10}{a} = \frac{6}{(a - 30)}$$

Step ii: Teacher guide the students to solve the equation L.C. M of a and $(a - 30)$

L.C.M = $a(a - 30)$

Multiply both sides by $a(a - 30)$

$$\begin{aligned} i.e \ a(a - 30) \times \frac{10}{a} \\ &= \frac{6}{(a - 30)} \\ &\times a(a - 30) \end{aligned}$$

$$(a - 30) \times 10 = 6 \times a$$

Expanding, we obtain

$$10a - 300 = 6a$$

$$4a = 300$$

Divide both sides by 4

$$\frac{4a}{4} = \frac{300}{4}$$

$$a = 75\text{km/h}$$

The speed in the first part of the journey is 75km/h

<p>Presentation</p> <p>10 minutes</p>	<p>Example 2</p> <p>A boy cycles 12km at a certain average speed. He then increases his speed by 4km/h and takes the same time to travel 15km. Find his speed for both parts of the journey.</p>	<p>Step i: Teacher guide the students to translate the statements to Mathematical equations</p> <p>Let his speed for the first journey be v.</p> <p>Then his speed for the second part of the journey is $v+4$km/h</p> <p>Time taken for first journey = $\frac{12}{v}h$</p> <p>Time taken for second journey = $\frac{15}{(v+4)}h$</p> <p>Step ii: Teacher guide the students to solve the equation</p> $\frac{12}{v} = \frac{15}{(v+4)}$ <p>Multiply both sides by $v(v+4)$</p> $12(v+4) = 15v$ $12v + 48 = 15v$ <p>Collect like terms</p> $48 = 15v - 12v$ $48 = 3v$ <p>Divide both sides by 3</p> $v = \frac{48}{3}$ $v = 16\text{km/h}$ <p>His speed for the first part of the</p>
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		journey was 16km/h and for the second part is $16+4= 20$ km/h.
Evaluation 10 minutes	Teacher ask the students questions based on what has been taught and give them class work.	Exercise: i. A man drives 146km at a certain average speed. He then increase this speed by 9km/h and takes the same time to travel the next 164km. find his speed for both parts of the journey.

Conclusion:The Teacher concludes the lesson by briefly explaining the main points of the lesson and allow the students to ask questions based on what has been taught in the class.

Lesson 8

School:J.G.S.S Manchok

Group:Group A for experimental group

Duration: 45 Minutes

Sex: Mixed

Subject:Mathematics

Topic: Further word problems involving fractions.

Previous Knowledge:Students have learned how to translate word problems involving fractions.

Teaching Aids:Projector, Blackboard, Chalk and Duster

Teaching Approach:Computer Based Instruction approach

Objective(s):At the end of the lesson, students should be able to:

- i. Translate word problems involving fractions into Mathematical statements
- ii. Solve word problems involving fractions.

LESSON DEVELOPMENT/PRESENTATION

Stages and Time	Teacher Role (Teaching Activity)	Expected Student Activity (Learning Points)
Mode of operating the computer	Teacher guide the students on how to operate the computer	i. Press the “on” key and observe the display file(lesson on algebraic word

10 minutes		<p>problems)</p> <ul style="list-style-type: none"> ii. Double click on the file(lesson on algebraic word problems) iii. Click on Read only on the dialogue displayed iv. On the Ribbon, click on slide show v. Locate and click from beginning button vi. Continue to click to display the content of algebraic word problems one after the other.
Introduction 5 minutes	What are the steps involve when solving problems involving fractions	<ul style="list-style-type: none"> i. Choose a letter to stand for the unknown. ii. Change the statements into Mathematical expressions.

<p>Presentation</p> <p>10 minutes</p>	<p>Example1</p> <p>30 is divided by the sum of 3 and x. If the result is 5, what is the value of x?</p>	<p>Step i: Translate the statement into Mathematical expression</p> <p>Sum of 3 and x = $3 + x$</p> <p>30 divided by the sum of 3 and x and the result 5 is</p> $\frac{30}{3 + x} = 5$ <p>Step ii: Teacher guide the students to solve the equation.</p> $\frac{30}{3 + x} = 5$ <p>Multiply both sides by $(3 + x)$</p> $(3 + x) \times \frac{30}{3 + x} = 5(3 + x)$ $30 = 5(3 + x)$ <p>Expand RHS</p> $30 = 5(3 + x)$ <p>Subtract 15 from both sides</p> $30 - 15 = 15 - 15 + 5x$ $15 = 5x$ <p>Divide both sides by 5</p> $x = 3$
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<p>Presentation</p> <p>10 minutes</p>	<p>Example 2</p> <p>A boy is 24 years younger than his father and in 2 years' time the sum of their ages will be 40. How old is the father and how old is the son now?</p>	<p>Step i: Choose a letter to stand for the unknown and translate the statement into Mathematical expression. Let the father's age be x years, the son is $(x - 24 + 2)$ years respectively. But the sum of their ages is 40 years.</p> <p>Thus: $(x + 2) + (x - 24 + 2) = 40$</p> <p>Step ii: Teacher guide the students to solve the equation</p> $(x + 2) + (x - 24 + 2) = 40$ $x + 2 + x - 24 + 2 = 40$ <p>Collect like terms</p> $2x - 20 = 40$ <p>Add 20 to both sides</p> $2x = 60$ <p>Divide both sides by 2</p> $x = 30$ <p>\therefore The father is 30 years old now and the son is $(30 - 24)$ or 6 years old.</p>
<p>Evaluation</p> <p>10 minutes</p>	<p>Teacher give class work to the students</p>	<p>Exercise:</p> <p>A boy is older than his sister by three years. 5 years ago, the ratio of their ages</p>

		was 4:3. Find their present ages.
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Conclusion: Teacher summarizes the lesson and allow students to ask questions.

Lesson 9

School: J.G.S.S Manchok

Group:Group A for experimental group

Duration: 45 Minutes

Sex: Mixed

Subject:Mathematics

Topic: Algebraic equations on word problems

Previous Knowledge:Students have learned how to solve word problems involving algebraic fraction.

Teaching Aids:Projector, Blackboard, Chalk and Duster

Teaching Approach:Computer Based Instruction approach

Objective(s):At the end of the lesson, the students should be able to solve problems involving equations.

LESSON DEVELOPMENT/PRESENTATION

Stages and Time	Teacher Role	Expected Student Activity
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	(Teaching Activity)	(Learning Points)
Mode of operating the computer 10 minutes	Teacher guide the students on how to operate the computer	<ul style="list-style-type: none"> i. Press the “on” key and observe the display file(lesson on algebraic word problems) ii. Double click on the file(lesson on algebraic word problems) iii. Click on Read only on the dialogue displayed iv. On the Ribbon, click on slide show v. Locate and click from beginning button vi. Continue to click to display the content of algebraic word problems one after the other.
Introduction 5 minutes	30 is divided by the sum of 3 and x. If the result is 5, what is the value of x?	$\frac{30}{3 + x} = 5$ $30 = 15 + 5x$ $30 - 15 = 5x$ $\frac{15}{5} = \frac{5x}{5}$ $x = 3$

<p>Presentation 10 minutes</p>	<p>Example 1</p> <p>I think of a number, I add six to it, the result is ten.</p> <p>What number did I think of?</p>	<p>Step i: Teacher guide the students to translate the word problem to Mathematical equation.</p> <p>Let the number be x</p> <p>Add six to it</p> $x + 6$ <p>The result is ten: meaning equate it to ten</p> $x + 6 = 10$ <p>Step ii: Teacher guide the students to solve the equation.</p> $x + 6 = 10$ <p>Subtract 6 from both sides</p> $x + 6 - 6 = 10 - 6$ $x = 4$ <p>The number is 4</p>
<p>Presentation 10 minutes</p>	<p>Example 2</p> <p>The sum of two numbers is 24. Twice the first plus the second is 26. Find the numbers.</p>	<p>Step i: Teacher guide the students to translate the word problem to Mathematical equation.</p> <p>Let x be the first number.</p> <p>The second number will be $(24 - x)$</p> <p>Thus $2x + (24 - x) = 26$</p> <p>Step ii: Teacher guide the students to</p>

		<p>solve the equation.</p> $2x + (24 - x) = 26$ <p>Collect like terms</p> $2x - x = 26 - 24$ $x = 2$ <p>\therefore the numbers are 2, $(24 - 2)$ or 22</p>
<p>Evaluation 10 minutes</p>	<p>Teacher gives the students class work to measure the success or failure of the lesson.</p>	<p>Exercise: The product of a certain number and 5 is equal to twice the number subtracted from 20. Find the number.</p>

Conclusion: The Teacher concludes the lesson by explaining the main points of the lesson and allowing the students to ask questions based on what has been taught in the class.

Lesson 10

School: J.G.S.S Manchok

Group: Group A for experimental group

Duration: 45 Minutes

Sex: Mixed

Subject: Mathematics

Topic: Application of word problems from everyday situation.

Previous Knowledge:Students have learned how to solve word problems involving equations.

Teaching Aids:Projector, Blackboard, Chalk and Duster

Teaching Approach:Computer Based Instruction approach

Objective(s):At the end of the lesson, students should be able to:

1. Solve word problems from everyday situation
2. Formulate word problems from everyday situations

LESSON DEVELOPMENT/PRESENTATION

Stages and Time	Teacher Role (Teaching Activity)	Expected Student Activity (Learning Points)
Mode of operating the computer 10 minutes	Teacher guide the students on how to operate the computer	<ol style="list-style-type: none"> i. Press the “on” key and observe the display file(lesson on algebraic word problems) ii. Double click on the file(lesson on algebraic word problems) iii. Click on Read only on the dialogue displayed iv. On the Ribbon, click on slide show

		<p>v. Locate and click from beginning button</p> <p>vi. Continue to click to display the content of algebraic word problems one after the other.</p>
<p>Introduction 5 minutes</p>	<p>A rectangular field which is 50 meters wide, requires 260 meters fencing. How long is the field?</p>	<p>Let the field be xm long.</p> <p>Then total length of the field is $(x + 50 + x + 50)$</p> <p>But the total length of the fence is 260m,</p> $\therefore x + 50 + x + 50 = 260$ $2x + 100 = 260$ $\frac{2x}{2} = \frac{160}{2}$ $x = 80$ <p>\therefore The field is 80 meters long.</p>
<p>Presentation 10 minutes</p>	<p>Example1</p> <p>Last year our family expenses amounted to ₦400 a month. Now the cost of living has risen by 75%. If we wish to maintain the same</p>	<p>Step i: Teacher guide the students to translate the word problem to Mathematical expression.</p> <p>Extra money required per month 75% of ₦400</p>

	<p>living standard, how much extra do my parents need every month?</p>	$\frac{75}{100} \times 400$ <p>Step ii: Teacher guide them to solve the expression</p> $\frac{75}{100} \times 400$ $75 \times 4 = 300$ <p>The family needs extra ₦300 per month.</p>
<p>Presentation 10 minutes</p>	<p>Example 2</p> <p>a. If the rice cost 75k per cup and beans cost 60k per cup, how much money does she need for 5 cups of beans?</p> <p>b. Formulate word problem from: A boy needs six 80 leaves exercise books, four biro pens, two pencils and a learner dictionary for school next term.</p>	<p>a. Step i: Teacher guide the students to translate the word problem to Mathematical expression.</p> $5 \times 0.75k + 0.60k \times 3$ $= 3.75k + 1.80k$ $= 5.55k$ <p>∴ she needs 5.55k</p> <p>b. If 80 leaves exercise books cost ₦1.50 each, biros cost 40k each, pencil cost 20k each and learners dictionary cost ₦20, how much money does the boy need for all the items?</p>

<p>Evaluation</p> <p>10 minutes</p>	<p>Teacher give the students class work to measure the success or failure of the lesson</p>	<p>Exercise:</p> <p>a. Formulate word problems from:</p> <p>A family has a dog and cat. It cost ₦10 a day to feed the dog and ₦5 a day to feed the cat.</p> <p>b. A girl hears that by selling a carton of milk a hawker gains ₦15.00. If a girl needs ₦180.00 for her school fees and pocket money for next term, how many cartons of milk should she sale during the holiday to get the ₦180.00?</p>

Conclusion: The Teacher concludes the lesson by briefly explaining the main points of the lesson and allowing the students to ask questions based on what has been taught in the class.

APPENDIX H

Lesson Plan for Control Group

Lesson 1

Topic: Word Problems

Objective(s): At the end of the lesson students should be able to

1. Express word problems in numerical expressions
2. Formulate word problems from numerical expressions.

Previous knowledge:

The students have mastered how to add, subtract and multiply numbers and write them in words.

Introduction:

The teacher introduces the lesson by asking questions on the previous knowledge, which will help students understand the lesson at hand.

Presentation

Step I:

The teacher guides the students on the use of equations to solve problems. This is one of the most important ideas we shall learn in algebra. Many of the real problems, which the engineer, scientist and other people connected with business and industry do encounter occasionally, are solved by the use of equations.

We shall first learn how to solve mathematical sentence from word sentence and vice versa.

Step II

The teacher guide them to consider the following examples (I) find the sum of six and nine
i.e $6+9$

2. What is the difference between eight and three? (i.e $8-3$)
3. Take away two from the sum of thirty five and sixteen (i.e. $35+16$)-2
4. Multiply seven by three and add four to the product (i.e. 3×7)+4

The teacher then asks them, what do you think of these examples are?

They are examples of words, which are expressed numerically.

Teacher gives guidance that, before attempting to solve any problem, read through it carefully from the beginning to the end and make sure you understand what the problem requires for an answer.

Step III:

The teacher guide the students to write the following word problems into expressions

1. What is the sum of thirteen and seven?
2. Find the difference between eleven and two
3. Divide the sum of six and sixteen by eleven
4. From the product of five and seven take away fourteen
5. Find the sum of all odd numbers between five and ten

6. From the sum of three and eight, take away two and divide the result by three
7. Take away two from the product of six and three and divide the result by four

Step IV

The teacher guides the students on how to change numerical expression into word problems.

- a) The numerical expression $\frac{(5+8)-3}{2}$ can be made into the following word problem.

Bala has 5 oranges and Sule has 8, they put their oranges together, gave three to their friend Abdullahi and share the rest equally between them. How many oranges those each have?

- b) The numerical expression $2 \times 25 + 7 \times 15$ can be: Musa bought two books at N25:00 each and 7 shirts at N15:00 each. How much did he spend altogether? Teacher then ask one or two students to give their own examples.

Summary

Teacher reviews the lesson briefly to make sure the students understand the lesson.

Assignment

The teacher gives the following as assignment:

- a. Formulate word problems from the following:

i. $\frac{(30-8)+2}{4}$ ii. $\frac{20+18+22}{15}$

- b. Translate the following words problems into numerical expression.

- i. Bello bought four dozens of eggs. How many eggs did he buy?

- ii. Tom added thirteen rocks to his collection of forty nine rocks. How many rocks did tom then have in all.

Lesson 2

Topic: Word Problems in sum and difference.

Objective

At the end of the lesson, the students should be able to solve word problems on sum and difference of whole numbers.

Previous Knowledge

Students have learned how to translate word problem into numerical expression and vice versa.

Introduction

Briefly revise your last lesson by asking the students some appropriate questions such as:

- i. Formulate word problem from the following $\frac{(3+8)-4}{2}$
- ii. Translate the following word problem into numerical expression. From the product of five and seven, take away fourteen.

Presentation

Step I

Discuss and guide the students to solve the problems.

- a. The sum of four consecutive numbers is 58. Find the number?

Ask what the numbers are?

Let the numbers be n , $n+1$, $n+2$, $n+3$.

The students discover that,

$$n+(n+1)+(n+2)+(n+3) = 58$$

$$4n+6 = 58$$

$$4n = 58-6$$

$$\frac{4n}{4} = \frac{52}{4}$$

$$n = 13$$

Therefore the numbers are 13, 14, 15, 16.

- b. What is the sum 12 and 9

Let the sum of 12 and 9 be n

$$\text{Then } 12+9 = n$$

$$21 = n$$

- c. Ojo bought 12 oranges from the market. Daddy plucked 14 more oranges from the garden. How many oranges does Ojo now have?

Let the students lead the discussion given a variety of ways in solving problem.

What is the problem? State clearly:

Ojo bought 12 oranges

Daddy plucked 14 oranges

Ojo now has $(12+14)$ oranges

Ojo now has 26 oranges.

The sum of a set of numbers is the result obtained when the numbers are added together.

Step II

Discuss and guide the students to solve problems involving both sum and difference.

- a. Given: The difference between 8 and another number is 17. Find the possible values for the number.

Solution: Assuming the other number to be x

$$x - 8 = 17 + 8$$

Add 8 to both sides

$$x - 8 + 8 = 17 + 8$$

$$\text{i.e. } x = 17 + 8$$

$$x = 25 \text{ or}$$

$$8 = 17 + x$$

Subtract 17 from both sides

$$8 - 17 = 17 - 17 + x$$

$$x = -9$$

the possible values may be 25 or -9.

- b. Sadiya was given 42 groundnuts by her friends. She gave 20 of them to her brother Faisal. How many nuts does Sadiya have left?

She has $(42 - 20)$ g/nuts left

She has 22 g/nuts left.

The students generalized by saying the difference between two numbers are the result of subtracting one from the other. It is usual to subtract the smaller from the larger. This gives a positive difference.

Summary

The teacher briefly revises what he has done so far for the benefit of the weak ones.

Evaluation

The teacher evaluates the lesson by asking the following questions in order to make sure whether they understand the lesson.

- i. The sum of three consecutive numbers is 63. Find the number.
- ii. The difference between 12.6 and a number is 5.4. Find the two possible values of the number.

Assignment

Teacher asks the students to solve the following:

- i. The sum of four odd numbers is 80. Find the numbers.
- ii. The difference between -3 and a number is 8. Find the two possible values for the number.
- iii. The sum of three consecutive odd integers is 72. What are the numbers?

Lesson 3

Topic: Word problems on product and quotient of whole numbers.

Objectives

At the end of the lesson, the students should be able to solve word problems on the product and quotient of whole numbers.

Previous Knowledge:

The students have already learned how to solve word problems on sum and difference of whole numbers.

Introduction:

The teacher introduces the lesson by asking students to solve word problem on sum and difference of whole numbers. For instance, the sum of three consecutive odd integers is 72.

What are the numbers?

Presentation

Step I

Investigate the question with the students. Musa had 5 sweets in his school bag, mummy promised to give him three times the quantity if he gets full marks in his English test, Musa got 10/10 in his English test, so mummy kept her word. How many sweets did mummy give Musa on his return from school?

Guide their thinking by asking questions, giving occasional units, make them relate to known ideas, which required reasons. Ask questions that demand students' participation such as how many sweets did Musa get?

Mummy gave Musa (5×3) sweets

Therefore Mummy gave Musa 15 sweets

Step II

Give them another example

- a. The product of two numbers is $\frac{84}{9}$. If one of the numbers is $\frac{1}{4}$, find the other.

Lead the discussion through questioning.

Let the number be X what is the unknown?

$$X \times \frac{1}{4} = \frac{84}{9}$$

Multiply both sides by 4 (Ask them why?)

$$\text{Thus } X = 4 \times \frac{84}{9}$$

$$X = \frac{337}{9}$$

- b. For example: Yesterday was Mrs. Ojo's birthday. She bought 32 sweets to share them among her 4 children. How many did she give each child?

Put the students through by asking leading question.

Such as: How many sweets did Mrs. Ojo buy?

How many children does she have?

She gave each child $(\frac{32}{4})$ sweets.

The teacher sees that they are able to solve the problem.

Summary:

The teacher reviews the entire lesson briefly so that all students understand. He further explains that the product of two or more numbers is the result when the numbers are multiplied together.

Assignment:

The teacher uses these tests to measure student's ability to discover new ideas.

- A. If I divide a number by three, I got 29 as the answer, what number did I divide by 3?
- B. Maryam and Isa have 82 groundnuts between them, and Isa has 4 more than Maryam. How many has Isa? Teachers should provide reading, research or investigations in which ideas are explained independently.

Lesson 4

Topic: The combination of product with sums and difference in word problems.

Objectives: The students should be able to solve the word problems combining products with sums and difference.

Previous Knowledge:

Students have learned how to solve word problem with the products and quotient of whole numbers.

Introduction:

Teacher should introduce the lesson by asking questions on the previous knowledge.

Step I

Guide students a variety of questions such as: Find the positive difference between 31 and the product of 4 and 14.

What is the product of 4 and 14?

Product of 4 and 14 = $4 \times 14 = 56$

What is the difference between 31 and 56?

Difference between 31 and 56 = $56 - 31$

$$= 25$$

Note that the problem is to find the difference between 31 and a product. Therefore, find the product first (4×14) 31 is equivalent to the “positive difference between 31 and the product of 4 and 14”.

Step II

Give them more examples. Find the product of 11 and the positive difference between 4 and 10.

Ask, what is the positive difference between 4 and 10?

Positive difference between 4 and 10 = $10 - 4$

$$= 6$$

What is the product of 11 and 6?

$$\begin{aligned}\text{Product of 11 and 6} &= 11 \times 6 \\ &= 66\end{aligned}$$

Note that the problem is to find the product of 11 and a positive difference. Therefore find the difference between first.

Hence $11 \times (10-4)$ is equivalent to the “product of 11 and the positive difference between 4 and 10”.

Consider the following examples also

- a. Find the sum of 0.9 and the product of 1.7 and 3

$$\begin{aligned}\text{Sum} &= 0.9 + (1.7 \times 3) \\ &= 0.9 + 5.1 \\ &= 6.0\end{aligned}$$

- b. Find the product of $1/7$ and the sum of $3/5$ and $1\frac{1}{2}$

$$\begin{aligned}\text{Product} &= 1/7 \times (3/5 + 1\frac{1}{2}) \\ &= 1/7 \times (3/5 + 3/2) \\ &= 1/7 \times (6/10 + 5/10) \\ &= 1/7 \times 21/10 \\ &= 3/10.\end{aligned}$$

- c. Find the positive difference the sum of 1.6 and 2 and the product of 7 and 0.4

$$\begin{aligned}\text{Difference} &= (1.6 + 2) - (7 \times 0.4) \\ &= 3.6 - 2.8\end{aligned}$$

$$= 0.8$$

Teacher stimulated the thinking of the students using dialogues wherever they are solving the above problems on the B.B (chalkboard) through questions and hints if possible.

Guesses, conjecture, trial and error will be used to search for ideas and to relate these new ideas to previous concepts.

Summary.

Teacher reviews the whole lesson briefly to ensure that they have understood the concept.

Assignment

The teacher then gives them the following work to do.

1. Find the product of 5 and the difference between 15 and 17.
2. Find the difference between the product of 0.6 and the sum of 0.6 and 0.4
3. Find the sum of 29, the product of 2 and 9 and the difference between 2 and 9.

Lesson 5

Topic: Word problems involving fractions

Objective: At the end of the lesson the students should be able to solve and simplify word problem involving fractions.

Previous Knowledge:

The students have learned how to add and subtract fractions.

Introduction:

The lesson is introduced by dissecting the students the numerical interpretation of word problems using equations and brackets where necessary.

Consider thus: one tenth of the sum of 5 and 8 is the same as $\frac{5+8}{10}$

Give the students to formulate and interpret word problems as done below

1. Find the sum of x and 4. (ans. = $x + 4$)
2. Find one ninth of the difference between the sum of 2 and 7 and a number 3

$$\text{(ans. } \frac{(2+7)-3}{9} \text{)}$$

Common and familiar examples should be used when teaching common fractions to facilitate understanding.

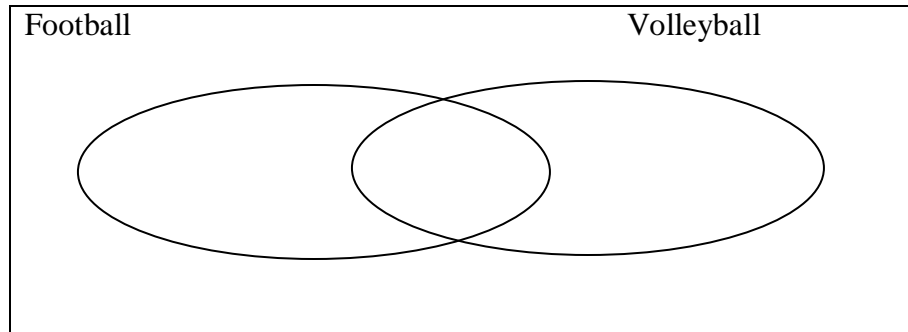
Presentation

Step I

Consider the following example.

- A. If one quarter of a class plays football only and one fifth plays volleyball only.

What fraction of the class plays neither football nor volleyball?



Let the number of students be x

Number of those playing football = $\frac{1}{4}x$

Number of those playing volleyball = $\frac{1}{5}x$

Let $n(F)$ be those who play football

Let $n(V)$ be those who play volleyball

$n(F \cup V)$ = sum of those playing football and volleyball

$n(F \cup V) = (x \times \frac{1}{4}) + (x \times \frac{1}{5}) - n(F \cap V)$

$$\frac{9}{20}x - 0$$

Therefore those playing neither football nor volleyball

$$= x - \frac{9}{20}x - 0$$

$$= \frac{11}{20}x$$

- B. In a family of eight, one-eighth of the members are very tall and quarter of them is very short. The rest are of average height. How many are of average heights in that family?

Solution

$$8(1 - (\frac{1}{8} + \frac{1}{4})) = \frac{8(8-1-2)}{8}$$

$$\begin{aligned}
 &= \frac{8(8-3)}{8} \\
 &= 8-3 \\
 &= 5.
 \end{aligned}$$

Step II

Teacher gives more examples such as:

What number is greater than half of 7 by 11

Solution:

Let the number be represented by x

Ask them what is half of 7?

Half of 7 is $7/2$

$$\therefore x - 7/2 + 7/2 = 11 + 7/2$$

$$x = 11 + 7/2$$

$$x = 11 \frac{7}{2}$$

$$= 29/2 = 14\frac{1}{2}$$

The number is $14\frac{1}{2}$.

Another example: what is the number such as that when $5/6$ of it is subtracted from

$2\frac{1}{2}$ the result is the same as when $2/3$ of it is added to it.

Solution:

Allow the students to attempt it

Let the number be x

Then ask them $\frac{5}{6}$ of it and $\frac{2}{3}$ of it are what?

$\frac{5}{6}$ of it and $\frac{2}{3}x$ it and $\frac{2}{3}x$

Then, $3\frac{1}{2} - \frac{5}{6}x = \frac{2}{3}x + x$

$$\frac{5}{2} - \frac{5}{6}x = \frac{2}{3}x + x$$

$$\frac{5}{2} - \frac{2}{3}x + x + \frac{5}{6}x$$

$$\frac{5}{2} = (\frac{2}{3} + 1 + \frac{5}{6})x$$

$$\frac{5}{2} = \frac{(4+6+5)x}{6}$$

$$\frac{5}{2} = \frac{15}{6}x$$

$$\therefore x = \frac{5}{2} \times \frac{6}{15}$$

$$x = \frac{3}{3} = 1.$$

Therefore the number is one.

Summary:

The teacher reviews the lesson to help the weak ones.

Assignment

The following is the class activity and assignment

- a. Find one ninth of the difference between 49 and 13 (ans 4)
- b. Find one third of the product of 12 and 5
- c. Find one-eighth of the sum of 14, 15 and 19
- d. Find the quarter of the difference between 17 and the square of 3
- e. Find one third of the difference between 29 and the sum of 11 and 6.

Lesson 6

Topic: More word problems involving simple algebraic fractions.

Objectives: At the end of the lesson students should be able to solve word problems involving simple algebraic fractions.

Previous Knowledge:

The students have learned how to solve word problems involving fractions.

Introduction:

Introduce the lesson by considering problems involving algebraic fractions that could be written in the form of statements. For instance, the average cost of certain number of books is N250:00. The total cost can be written as N250, 00n if n is the number of books.

Step I

Consider this example; the average cost of a number of pencils is 50k, if all the pencils cost N20.00. Find the total number of pencils.

Solution:

Let the number of pencils be x

$$\text{Average cost of pencils} = \frac{N20}{x}$$

Convert this to kobo

$$N20/x = 20/x \times 100$$

$$\text{Hence } 50 = \frac{20 \times 100}{x}$$

Multiply both sides by x

$$50x = 2000$$

Divide both sides by 50

$$\frac{50x}{50} = \frac{2000}{50}$$

$$\therefore x = 40$$

There are 40 pencils on the whole.

Consider another example for the students.

The weight of a certain group of boys is 1200kg.

If the average weight is 30kg, find the number of boys

Solution

Let the number of the boys be n

Total weight = 1200kg

Then average weight = $1200/n$

That is $30 = 1200/n$

Solving for n we have

$$30n = 1200$$

$$\text{Then } \frac{30n}{30} = \frac{1200}{30}$$

$n = 40$ there are 40 boys.

The students should be able to deduce that when solving word problems or simple equations involving fractions, the following should be considered:

1. What is the unknown
2. Choose letter to represent the unknown

3. Write the statement into an equation form
4. Solve the problem

Summary

Go over the lesson briefly so the weaker ones will understand.

Assignment

1. A hunter kills x number of bush rats, the total weight of these is 48 kg. What is the average weight of the animals in terms of x ? (ans $48/x$ kg).
2. The total cost of a number of school bags is N56:00. Each bag cost N2:00.
 - a. Write one equation connecting the N56:00 and N2:00 and the number of school bags. (ans. $56/x = 2$).
 - b. Find the number of school bags (ans. 28).
3. A man buys a shirt each for his sons at a total cost of N32:00. If the average cost of the shirt is N4:00, how many sons does the man have? (ans. 8).

Lesson 7

Topic: Algebraic Fractions

Previous Knowledge: The students have learned how to solve simple equations.

Introduction:

Teacher introduces the lesson by asking relevant questions on the previous knowledge.

Presentation

Step I

Teacher guide the students that in this lesson they will consider more difficult problems involving fractional algebraic equations.

Example I

A certain car covers 10km at a certain average speed. If this average speed is reduced by 30km/h, the car takes the same amount of time to cover a distance of 6km. find the speed of the car in the first part of the journey.

Solution

The teacher leads the students by identifying the key or essential statement in word problems and should be written out on the chalk board, then their translation into symbolic statements can be done bit by bit.

Let the speed for the first part = a km/h

\therefore the speed for the second part = $(a - 30)$ km/h

Time taken by first car to cover 10km = $10/a$ h

Time take by second car to cover 6km = $6km (a - 30)/h$

These times are the same, in both journey

$$\therefore 10/a = 6/(a - 30)$$

This equation can now be easily solved as follows:

Find the LCM of a and (a-30)

$$\text{LCM} = a(a-30)$$

Multiply both sides by a(a-30)

$$\text{i.e } a(a-30) \times 10/a = a(a-30) \times 6/(a-30)$$

$$(a-30) \times 10 = 6 \times a$$

Expanding, we obtain

$$10a - 300 = 6a$$

$$\therefore a = 75\text{km/h}$$

The speed in the first part of the journey is 75km/h.

Example 2

A boy cycles 12 km at a certain average speed .

He then increases his speed by 4km/h and takes the same time to travel 15km. find his speed for both parts of the journey.

Solution

The problem is to find the boy's speed. Let his speed for the first part of the journey be v km/h.

Then his speed for the second part of the journey is $v + 4$ km/h

(from the second sentence of the question)

Time taken for first part = $12/v$ h

Time taken for second part = $15/(v+4)$ h

The two times are the same thus

$$12/v = 15/(v+4)$$

Multiply both sides by $v(v+4)$

$$12(v+4) = 15v$$

$$12v + 48 = 15v$$

$$48 = 15v - 12v$$

$$48 = 3v$$

$$16 = v$$

His speed for the first part of the journey was 16 km/h and for the second part 20 km/h.

Activities

Students should attempt the following:

1. When full, a car's petrol tank holds k litres.

After using 15 litres, the remaining petrol is enough for the car to travel 344 km.

- a. Express the amount of petrol in terms of k (ans. $k - 15$ litres)
 - b. Hence express the distance that the car travels in terms on 1 litre of petrol in terms of k (ans. $\frac{344k}{k-5}$)
 - c. If the car travels 8 km/litre, find the value of k . (ans. $k = 59$).
2. A man drives 146 km at a certain average speed. He then increase this speed by 9 km/h and takes the same time to travel the next 164 km. find his speed for the both parts of the journey. (ans. 73 km, 82 km/h).
 3. A man travels 29 km on an open road at a certain average speed. In the city, he reduces his average speed by 42 km/h and find that it took him the same time to cover 15 km. find his average speed:
 - a. On the open road (ans. 87 km/h)
 - b. In the city (ans. 45 km/h).

Summary

Teacher explains to the students that in this lesson they have studied how to solve problems on simple equations involving fractions. The simple equations involve monomial and binomial denominators. He then guides them to conclude that the following steps may be necessary whenever they are solving word problems:

1. Find the LCM of all denominators

2. Multiply each term in the equation by this LCM
3. Simplify and solve the resulting equations.

Lesson 8

Topic: Further word problem involving fractions

Objectives: At the end of the lesson the students should be able to:

- i. Translate word problems involving fractions into mathematical statements
- ii. Solve word problems involving fractions.

Previous Knowledge

They have learned how to translate word problems involving fractions.

Presentation

Step I

Teacher discuss with class when solving problems of this kind, what do we look for?

Choose a letter to stand for the unknown. Change the statement in question into algebraic expressions. After such discussion with the students, consider these examples.

Example I

30 is divided by the sum of 3 and x . if the result is 5, what is the value of x ?

Solution

What is the sum of 3 and x?

$$\text{i.e } 3 + x$$

what is 30 divided by the sum of 3 and x and the result is 5

$$\text{i.e } 30/3 + x = 5$$

Multiply both sides by $(3 + x)$

$$(3+x) \times 30/3 + x = 5 (3 + x)$$

$$30 = 5(3 + x)$$

Expanded RHS and solve

$$30 = 15 + 5x$$

Subtract 15 from both sides

$$30 - 15 = 15 + 5x - 15$$

$$15 = 5x$$

Divide both sides by 5

$$\therefore x = 3$$

Example 2

A boy is 24 years younger than his father and in 2 years time the sum of their ages will be 40.

How old is the father and how old is the son now?

Solution

Let the father's age be x years, the son is $(x - 24 + 2)$ years respectively. But the sum of their ages is 40 years.

$$\text{Thus: } (x+2) + (x-24+2) = 40$$

$$x+2 +x-24+2=40$$

$$2x - 20 = 40$$

$$2x = 60$$

$$x = 30$$

Therefore, the father is 30 years old now and the son is $(30 - 24)$ years or 6 years old.

Example 3

A boy is older than his sister by three years, 5 years ago, the ratio of their ages was 4:3. Find their present ages.

Solution

Let the boy's age be x

\therefore His sister's age = $x - 3$

5 years ago, the boy's age = $(x - 5)$ years

∴ The sister's age then = $(x - 3) - 5$

$$= (x - 8) \text{ years}$$

If the ratio of their ages = 4:3

$$\text{Then } \frac{x - 5}{x - 8} = \frac{4}{3}$$

The LCM of $(x - 8)$ and 3 = $3(x - 8)$

Multiply both sides by the LCM

$$\text{We have } 3(x - 8) \times \frac{(x - 5)}{x - 8} = 3(x - 8) \left(\frac{4}{3}\right)$$

Expanding both sides

$$3x - 15 = 4x - 32$$

$$\text{i.e } 3x - 15 + 15 = 4x - 32 + 15$$

$$\text{i.e } 3x = 4x - 17$$

$$3x - 4x = 4x - 17 - 4x$$

$$-x = -17$$

$$-1(-x) = -1(-17)$$

$$\therefore x = 17 \text{ and } x - 3 = 15$$

So the boy's age = 17 years and his sister's age = 14 years. The teacher should emphasize this step involving multiplication by (-1) and discourage students from saying "minus cancel minus".

Example 4

A man is 5 years older than his wife, 4 years ago the ratio of their ages was 7:6.

Find their present ages.

Solution

The problem is to find their ages, let the age of the man be y years. Then the age of his wife is $y-5$ years. (From the first sentence of the question).

Then 4 years ago their ages were as follows

Man's age = $(y-4)$ years

Wife's age = $(y-4)-5 = y-9$ years

Thus the ratio of their ages 4 years ago was 7:6

Thus $\frac{y-4}{y-9} = \frac{7}{6}$

Multiply both sides by $6(y-9)$ (LCM)

$$6(y-4) = 7(y-9)$$

$$6y-24 = 7y-63$$

$$63-24 = 7y-6y$$

$$39=y$$

The man's age is 39 years and the wife's age is 34 years.

Summary

Teacher reviews the lesson briefly for proper understanding of the weak ones.

Activities

Solve the following word problems:

1. The weight of a man and that of his son differ by 12kg and are in the ratio of 9:6.
Find the weight of each. (ans. Man's weight = 37kg, son's weight = 15kg)
2. A woman is 25 years old older than the son.
 - a. If the son is x years, find the age of the mother.
 - b. Find their respective ages if the ratio of their ages four years ago was 5:2.
(ans. $x+25$, b. woman's age $45 \frac{2}{3}$, son's age $20 \frac{2}{3}$).
3. The difference between the height of a man and his son is 0.4cm. if the father is taller than the son and the ratio of their height is 4:3, find the son's height.
4. A man is 30 years older than his gardener.
 - i. If the gardener is x years old, how old is the man. (ans. $(30+x)$)
 - ii. Express the age of the man 6 years ago in terms of x . (ans. $(24+x)$)
 - iii. Express the age of the gardener 6 years ago in terms of x . (ans. $x-6$)
 - iv. 6 years ago, the ratio of their ages was 5:3. Find their ages. (ans. man's age =81, gardener = 51).

Lesson 9

Topic: Solving algebraic equations on word problems

Objective: At the end of the lesson the students should be able to solve problems involving equations.

Previous Knowledge

They have learned how to solve word problems involving algebraic fraction.

Introduction

Ask questions on the previous knowledge

Presentation

Step I

Guide them through two examples to illustrate how word problems can be solved by algebraic method.

Example 1

I think of a number I add six to it, the result is ten. What number did I think of?

Ask the class can we express the above problem using fewer words?

Yes we can.

A certain number plus six is ten find the number. Again ask them, can we make the above sentence shorter if we use the above variable say x ? yes

$x + 6 = 10$ find x .

Example 2

John is six years older than Paul. How old is Paul if John's age is three times Paul's age?

Can we reduce the problem? Yes

Suppose Paul is x years old? Then John is $(x+6)$ years old. Also John is $3x$ years old, then $x + 6 = 3x$

This problem which is rather difficult to solve by arithmetic methods, is now reduced to a simpler equation. We refer to problems which are best solved by algebraic method as algebraic problems. Let the students use as many examples as possible, such as:

- i. Isa is 3cm taller than Bello, if Bello is x cm tall, then Isa is $(3+x)$ cm tall.
- ii. Peter is three times as tall as Moses. If Moses is x meters tall, then Peter is $3x$ meters tall.
- iii. Mairo and Janet have N42. If Mairo has Ny , then Janet has $N(42-y)$.
- iv. Maryam is a year old, four years ago her age was $(a-4)$ years, and so on.

Step II

Having had practice in writing expression of certain numbers in terms of other numbers.

Now we shall proceed to solve problem using algebraic method.

Example 1

The sum of two numbers is 24. Twice the first plus the second is 26. Find the numbers.

Solution

If x is the first number, then $(24-x)$ is the second number. But twice the first plus the second is 26.

$$\text{Thus } 2x + (24-x) = 26$$

$$2x + 24 - x = 26$$

$$24 - x = 26 - 24$$

$$x = 2.$$

Therefore, the numbers are 2 and $(24-2)$ or 22.

Example 2

The product of a certain number and 5 is equal to twice the number subtracted from 20. Find the number?

Let the number be x

The product of 5 and x is $5x$

Twice x subtracted from 20 is $20 - 2x$

$$\text{Thus, } 5x = 20 - 2x$$

Adding x to both sides

$$7x = 20$$

Divide both sides by 7

$$x = 20/7 = 2 \frac{6}{7}.$$

Example 3

A rectangular field which is 50 meters wide, requires 260 meters fencing. How long is the field?

Solution

If the field is x meters long, then the total length of the fence around the field is $(x + 50 + x + 50)$ m

But, the total length of the fence is 260 meters.

$$\text{Thus: } x + 50 + x = 260$$

$$2x + 100 = 260$$

$$2x = 160$$

$$x = 80$$

Therefore the field is 80 meters long.

Summary

Teacher reviews the lesson to help the weak ones.

Activities

1. A certain number is less than another by 3. If their difference is 38, find the numbers. (ans. 20, 17).
2. The sum of a number, three times the number, and five times the number is 171. Find the number. (ans. 19).
3. I think of a certain number, if I multiply it by 6, add 8 to the product and double the sum, I will get 40. What is the number? (ans. 2).
4. The sum of two consecutive even numbers is 54. Find the numbers (26, 28).
5. The sum of two consecutive odd numbers is 20. What are the numbers? (103, 105).

Lesson 10

Topic: Application of word problems from everyday situations.

Objectives: At the end of the lesson students should be able to:

1. Solve word problems from everyday situations.
2. Formulate word problems from everyday situations.

Previous Knowledge

Students have learned how to solve word problems involving equation.

Introduction

Ask questions on the previous knowledge.

Presentation

Step I

The teacher creates a situation such as:

A girl hears that by selling a carton of milk a hawker gains N15:00.

Example 1 Problem

If a girl needs N180:00 for her school fees and pocket money for next term, how many cartons of milk should she sell during the holiday to get the N180:00?

Solution

N15 is gained from selling 1 carton

N180 is gained from selling $\frac{N180}{N15}$

= 12 cartons.

Example 2 Situation

A boy needs six 80 leaves exercise books, four biro pens, two pencils and a learner dictionary for school next term.

Problem : If 80 leaves exercise books cost N1.50 each, biros cost 40k each, pencil cost 20k each and learners dictionary cost N20, how much money those the boy need for all the items?

Solution

6 (N1.5 + 4) x (40k + 2) x (20k + N20)

$$= N9 + N1.6 + 40k + N20$$

$$= N31$$

∴ The boy needs N31.

Step II

Assist and guide the students in creating situations and problems that come up daily in their lives. For example

Example 2 Problem

Cost of living rises by 75%

Problem

Last year our family expenses amounted to N400 a month. Now the cost of living has risen by 75%. If we wish to maintain the same living standard, how much extra do my parents need every month?

Solution

Extra money required per month

$$= 75\% \text{ of } N400$$

$$= 75/100 \times 400$$

$$= 75 \times N4$$

= N300

The family needs extra N300 per month.

Example 2 Situation

Mother wants to prepare lunch. Most of the things she need are at home but she needs to buy 5 cups of rice and 3 cups of beans.

Problem:

If the rice cost 75k per cup and beans cost 60k per cup, how much money does she need for 5 cups of rice and 3 cups of beans?

Solution

$$5 \times 0.75k + 0.60k \times 3$$

$$= N3.75k + N1.80k$$

$$= N5.55k$$

Mother needs N5.55k.

Summary

The teacher reviews the whole lesson briefly for the weak ones.

Activities

Ask the students to formulate word problems from the following everyday situation:

1. The cost of rice goes down by 25%
2. Daddy spends N500 every week on petrol

3. A family has a dog and cat. It cost N10 a day to feed the dog and N5 a day to feed the cat.
4. A man pays his laborers N240 per day
5. Ibrahim spends N15 every day on transport to work and back.

APPENDIX I

Scores of pretest, posttest and post-posttest of experimental group (CBI)

S/NO.	PRETEST	POST TEST	POST-POST TEST	SEX
1.	48	92	84	M
2.	36	52	84	M
3.	34	74	76	M
4.	30	62	66	M
5.	28	94	62	M
6.	26	76	62	M
7.	20	64	52	M
8.	18	82	52	M
9.	18	62	52	M
10.	16	64	52	M
11.	14	82	52	M
12.	12	84	56	M
13.	12	82	52	M
14.	12	66	54	M
15.	10	82	42	M
16.	24	66	42	M
17.	24	82	32	M
18.	22	64	44	M
19.	20	32	44	M
20.	08	42	42	M
21.	06	44	42	M
22.	06	22	28	M
23.	04	44	28	M
24.	06	42	24	M
25.	08	42	20	M
26.	02	32	14	M
27.	04	32	14	M
28.	02	34	12	M
29.	40	52	82	F
30.	34	92	82	F
31.	30	72	78	F
32.	30	62	68	F
33.	26	92	68	F
34.	28	74	64	F
35.	20	64	52	F
36.	18	94	54	F
37.	16	72	52	F
38.	14	62	54	F
39.	14	78	56	F
40.	14	76	54	F
41.	12	62	32	F
42.	10	64	34	F
43.	10	62	42	F
44.	24	82	22	F
45.	22	64	44	F
46.	22	68	48	F
47.	10	44	44	F
48.	06	42	32	F
49.	08	48	30	F
50.	04	44	26	F

APPENDIX J

Scores of pretest, posttest and post-posttest of control group (CLM)

S/NO.	PRETEST	POST TEST	POST-POSTTEST	SEX
1.	46	56	65	M
2.	34	32	58	M
3.	32	62	66	M
4.	28	46	55	M
5.	30	48	52	M
6.	26	54	51	M
7.	18	72	40	M
8.	20	42	41	M
9.	14	68	29	M
10.	14	20	32	M
11.	12	52	41	M
12.	14	88	20	M
13.	12	42	42	M
14.	12	46	20	M
15.	10	56	30	M
16.	22	50	28	M
17.	26	52	34	M
18.	24	12	34	M
19.	22	18	28	M
20.	06	22	32	M
21.	08	24	18	M
22.	08	22	16	M
23.	06	24	15	M
24.	08	32	11	M
25.	02	36	11	M
26.	42	32	42	F
27.	36	74	42	F
28.	32	22	50	F
29.	28	14	53	F
30.	30	56	41	F
31.	26	58	40	F
32.	22	24	33	F
33.	16	44	34	F
34.	18	54	33	F
35.	18	50	34	F
36.	16	82	35	F
37.	14	24	34	F
38.	10	74	20	F
39.	08	12	23	F
40.	12	54	21	F
41.	22	42	30	F
42.	24	44	23	F
43.	20	20	25	F
44.	10	14	29	F
45.	04	24	20	F
46.	02	26	18	F
47.	02	28	16	F
48.	04	26	11	F

APPENDIX K
Summary of t-test for Pretest

T-Test

[DataSet1]

Group Statistics

Groups		N	Mean	Std. Deviation	Std. Error Mean
Pretest scores	Experimental Group	50	17.64	10.680	1.510
	Control Group	48	18.13	10.730	1.549

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Pretest scores	Equal variances assumed	.003	.960	-.224	96	.823	-.485	2.163	-4.779	3.809
	Equal variances not assumed			-.224	95.798	.823	-.485	2.163	-4.779	3.809

APPENDIX L

Summary of t-test for performance of Experimental and Control Groups (Posttest)

T-Test

[DataSet1] C:\Users\HP\Desktop\Isty Data\Isty Posttest scores.sav

Group Statistics

		N	Mean	Std. Deviation	Std. Error Mean
CBI/LM	Computer Based Instruction	50	58.94	18.784	2.656
	Lecture Method	48	39.71	20.923	3.020

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means	
		F	Sig.	t	df
CBI/LM	Equal variances assumed	.984	.324	4.792	96
	Equal variances not assumed			4.782	93.930

Independent Samples Test

		t-test for Equality of Means			
		Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval
					Lower
CBI/LM	Equal variances assumed	.000	19.232	4.013	11.266
	Equal variances not assumed	.000	19.232	4.022	11.246

APPENDIX M

Summary of t-test for performance of Male and Female Student in the Experimental Groups (Posttest)

T-Test

[DataSet1] C:\Users\HP\Desktop\Isty Data\Isty Posttest scores.sav

Group Statistics

Scores		N	Mean	Std. Deviation	Std. Error Mean
Score	male	28	60.89	20.518	3.878
	Female	22	66.82	15.277	3.257

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means	
		F	Sig.	t	df
Score	Equal variances assumed	3.627	.063	-1.130	48
	Equal variances not assumed			-1.170	47.890

Independent Samples Test

		t-test for Equality of Means			
		Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval
					Lower
Score	Equal variances assumed	.264	-5.925	5.245	-16.471
	Equal variances not assumed	.248	-5.925	5.064	-16.108

APPENDIX N

Summary of t-test for performance of Experimental and Control Groups

(Post Posttest)

T-Test

[DataSet2] C:\Users\HP\Desktop\Isty Data\Isty Post post scores.sav

Group Statistics

GrouoCBILM		N	Mean	Std. Deviation	Std. Error Mean
CBILMPost	Computer Based Instruction	50	48.04	18.746	2.651
	Lecture Method	48	32.48	14.222	2.053

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means	
		F	Sig.	t	df
CBILMPost	Equal variances assumed	3.111	.081	4.615	96
	Equal variances not assumed			4.641	91.193

Independent Samples Test

		t-test for Equality of Means			
		Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence ...
					Lower
CBILMPost	Equal variances assumed	.000	15.561	3.372	8.868
	Equal variances not assumed	.000	15.561	3.353	8.901

APPENDIX O

Summary of t-test for performance of Male and Female Student in the Experimental Groups (Post Posttest)

T-Test

[DataSet2] C:\Users\HP\Desktop\Isty Data\Isty Post post scores.sav

Group Statistics

Scores	N	Mean	Std. Deviation	Std. Error Mean
Score male	28	45.86	19.588	3.702
Female	22	50.82	17.671	3.767

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means	
		F	Sig.	t	df
Score	Equal variances assumed	.157	.693	-.928	48
	Equal variances not assumed			-.939	47.029
Independent Samples Test					
		t-test for Equality of Means			
		Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval Lower
Score	Equal variances assumed	.358	-4.961	5.348	-15.715
	Equal variances not assumed	.352	-4.961	5.282	-15.586