A STUDY ON THE IMPACT OF STAR STRATEGY ON THE ACHIEVEMENT OF VIII STD STUDENTS IN THE WORD PROBLEMS OF ALGEBRA THROUGH VIDEO LESSON

A research project report
Submitted
to

STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING
CHENNAI -600006

Submitted
by
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DISTRICT INSTITUTE OF EDUCATION AND TRAINING
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FOREWORD

Research is part and parcel of the regular academic supportive activities of the DIET Faculty members. The SCERT has been guiding and funding the research activities of the DIET including District Research Project. A district level issue or survey is taken and is executed in a period of six months. The findings are disseminated at the state level program, exclusively convened for this.

Dr. S. Muthukaruppan, Lecturer has put in his best efforts in finding a problem, treating it and helping teachers find new ways. Many newer topics keep emerging from the districts, thanks to research project.

I appreciate the efforts of Dr. S. Muthukaruppan, is selecting and executing this district research project, entitled “A study on the impact of STAR strategy on the achievement of VIII std students in the word problems of algebra through video lesson”.

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CERTIFICATE

It is certified that the district level research report entitled “A study on the impact of STAR strategy on the achievement of VIII std students in the word problems of algebra through video lesson” is an original and independent research work done by Dr. S. Muthukaruppan, Lecturer, DIET Pudukkottai in Pudukkottai District and it has not previously formed basis for any research work or any award.

Place: Pudukottai

Date:

Signature

(**Dr. G. Murugan)**

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DECLARATION

I hereby declare that the district level research report entitled **"A STUDY ON THE IMPACT OF STAR STRATEGY ON THE ACHIEVEMENT OF VIII STD STUDENTS IN THE WORD PROBLEMS OF ALGEBRA THROUGH VIDEO LESSON"** is an original and independent research work carried out under the guidance of Dr. G.Murugan, Principal, DIET, Pudukkottai and it has not been submitted for the award of any degree, diploma, associateship, fellowship of any University or Institution.

Place: Pudukkottai

Date: Signature of the investigator

(Dr. S. MUTHUKARUPPAN)

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Dr. S. Muthukaruppan

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INTRODUCTION

1.1 INTRODUCTION

Education aims at an all-round and total perfection of the individual and society. In education the importance and the place of particular subject depends up on the fact that "to what extent the subject is helpful in achieving the aims of education." The main focus of education is the transaction between the teacher and learner in various kinds of formal and informal settings. Mathematics has been a peculiar subject. Based on the recommendations of Education Commission (1964-66) Mathematics is a compulsory subject for all school students. Gagne's hierarchy of learning helps the teacher in formulating apt strategies of teaching, taking into consideration the level of learning involve often, and class instructional objectives may involve a combination of the various categories of learning listed by Gagne. All great educationist like Herbert, Pestalozzi etc.; have accepted Mathematics as a symbol of human development, accepting Mathematics as the best means of intellectual and cultural developments, these educationists place Mathematics on the top in the curriculum

Mathematics is an important subject in everyday life. Bouck (2010) defined Mathematics manipulative as "Physical objects students can manipulate to explore and develop an understanding of a mathematical concept" (p. 186).Students feel Mathematics is an abstract and difficult subject largely due to the strategy followed by the teachers. Many students find difficult to find solution to the problems in Mathematics. Most of the time the class room Mathematics preoccupied with routine teaching and not much time is devoted to learning of Mathematics. So the students struggle even to get pass marks in the examination. Students used to neglect the topics like fraction, algebra word problems. Many students with learning disabilities and emotional disturbances experience difficulty with higher-level math, including algebra and problem-solving skills (Maccini McNaughton, &Ruhl, 1999). It is solely the responsibility of the teachers handling Mathematics to use suitable teaching strategies and techniques which make the teaching effective, successful and interesting.

Mathematics play a vital role in achieving the aims of education, as compared to other subjects. But Mathematics has been often ignored and more often disliked by the pupils, parents and teachers. Surveys continue to show that it is regarded as most difficult and unpleasant subject by majority of children. If learning in school pays adequate attention to the

development of attitudes, transfer of learning will be ensured. Attitudes help in integrating learning and in the transfer of learning from one situation to another. The review of various researches clearly indicates that the problem of low achievement in Mathematics is due to the negative attitude of students thinking that it is too difficult to understand the subject. To enhance the understanding level of students and overcome the problem of low achievement in Mathematics right attitude should be developed among the students towards Mathematics. So it is the responsibility of every school to organize deliberate plans and programs of influencing positive attitudes in the child.

Mathematics play a vital role in achieving the aims of education, as compared to other subjects. But Mathematics has been often ignored and more often disliked by the pupils, parents and teachers. Surveys continue to show that it is regarded as most difficult and unpleasant subject by majority of children. If learning in school pays adequate attention to the development of attitudes, transfer of learning will be ensured. Attitudes help in integrating learning and in the transfer of learning from one situation to another. The review of various researches clearly indicates that the problem of low achievement in Mathematics is due to the negative attitude of students thinking that it is too difficult to understand the subject. To enhance the understanding level of students and overcome the problem of low achievement in Mathematics right attitude should be developed among the students towards Mathematics. So it is the responsibility of every school to organize deliberate plans and programs of influencing positive attitudes in the child.

Word problem skills is important to the algebraic cognition and in the aspect of Mathematics competence critical for lateral school success National Policy on Education (NPE1986)also emphasizes that Mathematics should be visualized as the vehicle to train a child to think, reason, analyze and articulates logically apart from the subject involving analysis and reasoning. In order to remedy this problem of poor Mathematics achievement, teachers need to adopt the best teaching strategies. Levy (2008) agreed by defining differentiated instruction as, “a set of strategies that will help teachers meet each child where they are when they enter class and move them forward as far as possible on their educational path” Word problem skills is important to the algebraic cognition and in the aspect of Mathematics competence critical for lateral school success.

Teaching techniques makes the lesson interesting and helps the teacher to explain the content easily and help the students to remember for a long time. Techniques are not directly linked with teaching objectives but methods are linked with objectives. On the other hand teaching strategies are purposefully conceived and determination in the plan of action. Teaching strategies and techniques are used to make the teaching effective, successful and interesting. But the same methodology is adopted by the teacher to all the types of problems especially word problems of algebra in Mathematics and for all types of students. This makes the students to feel Mathematics is very difficult to study .So many students are unable even to get pass in the Mathematics examination. Hence Teacher training institute should focus on what is needed by the teachers. Trainers should recognize the content knowledge and pedagogical expertise teachers bring with them from the classroom to empower teachers to feel more confident when incorporating technology into their curricula. As they become more comfortable with the technologies they work with, they will be more likely to explore the technologies further and teach others about what they have learned. They will become less dependent on others and more self-directing with their approach to the technology.

To overcome this problem suitable strategy should be adopted by the teacher to create interest in the subject. Knapp (2003) suggests that for a professional development session to be successful, it must include these six characteristics in sequential order. To be successful, the professional developments session must concentrate on classroom teaching that emphasizes high learning standards, focus on building teachers' pedagogical content knowledge, model "preferred" instructional practices, locate professional learning in collaborative, collegial and generally school based learning environments, offer rigorous and cumulative opportunities for professional learning over time and align with reform initiatives.

To enhance the understanding level of students and overcome the problem of low achievement in Mathematics STAR strategy is discussed in this study. In the present study power point presentation, video lesson, self-learning material, group activities and work sheets are used to enhance the achievement of VIII std students in the word problems of Algebra in Mathematics.

1.2 IMPORTANCE OF MATHEMATICS

Mathematics is the queen of science that holds other subjects like physics, chemistry and geography together. Science and Mathematics are the foundation for technology for the

growth and development of any nation. Quality in mathematics education is very important in this information technology age to make the nation forward scientifically and technologically Adewumi (2005) concludes that without Mathematics, there is no science, without science there could be no modern technology. Even though the importance and contributions of Mathematics to every aspect of human development, the subject is still faced with the problem of poor performance by the students at secondary school level.

The main focus of education is the transaction between the teacher and learner in various kinds of formal and informal settings. Based on the recommendations of Education Commission (1964-66) Mathematics is a compulsory subject for all school students. The National Policy on Education (NPE1986)also emphasizes that Mathematics should be visualized as the vehicle to train a child to think, reason, analyze and articulates logically apart from the subject involving analysis and reasoning. Many students feel Mathematics is a difficult subject largely as a result of the way of teaching .Classroom Mathematics mastering formulas, these students do not understand how Mathematics have been meaningful.

Today, Mathematics holds an important place in schools .For giving a place in school curriculum there is no special need of evaluation and testing of it. It has its own disciplinary values. In addition to these, Mathematics also helps to develop those qualities which can be developed by other subjects. Mathematics play a vital role in achieving the aims of education, as compared to other subjects. The importance of Mathematics can be expressed in the form of values. There certain values of Mathematics. On the basis of these values we can prove its importance in school curriculum. Mathematics helps in attaining and developing various values among the children.

In education the importance and the place of particular subject depends up on the fact that “to what extent the subject is helpful in achieving the aims of education.” If any subject is more useful for achieving the educational objectives then its importance increase accordingly .since ancient times Mathematics play a vital role in achieving the aims of education, as compared to other subjects

1.3 WORD PROBLEMS

Word problems contain figures and letters. Students sometimes believe that mathematical word problems have low complexity. Some students believe that they can

answer any mathematics question with a one-step mathematical procedure. Students need to learn that because the answer may not come from a one-step procedure that they need to continue to try to solve for the answer. However, despite the importance and contributions of Mathematics to every facet of human development, the subject is still faced with the problem of poor performance by the students at secondary school level. Students feel difficult to understand word problems due to the lack of language skills, vocabulary skills and to know the content.

e.g. How to share 12 biscuits to five children equally? How much will each one get? In the above problem language skill is more important than problem solving skill. Word problems can be divided into two parts.

1. Information in the word problems
2. Method for analysis.

Mathematics word problems cannot be solved if the students are not familiar with the cultural context of the mainstream society or the cultural knowledge that is taken for granted. The syntax-language structure-used in Mathematics is highly complex and very specific. Mathematics uses syntactic features that many students find both cumbersome, and also quite confusing. Perhaps more than any other subject, teaching and learning Mathematics depends on language. Mathematics is about relationships: relationships between numbers, between categories, between geometric forms and between variables. In general, these relationships are abstract in nature and can only be brought into being through language.

According to Riordain & O'Donoghue (2009), mathematical language is an essential element of learning, thinking, understanding and communicating Mathematics. Algebraic thinking involves the use of symbols to generalize certain kinds of arithmetic operations and the ability to represent relationships. (Xin et al., 2011). When information about the problem is presented as text rather than in mathematical notation, the problem becomes a word problem. To enhance the achievement of students in algebra basic skills, terminology, problem representations, problem solving, and self-monitoring strategies are needed for the students with LD, It was found from various researches that students with LD fail to automatize even the most basic skills that would allow them to concentrate on more conceptually difficult problems, such as word problems (Jittendra et al., 1998). Word-problem solving presents persistent difficulties for those students when they have coexisting deficits in either reading or computation, or both (Jittendra et al, 1998). Many students lack the ability to decode the

meaning in the question and tend to think that all information given is useful, resulting in their incompetence in summarizing the task at hand. In word problem many students feel difficult to understand the question correctly due to inadequate knowledge of vocabulary. Others demonstrate serious difficulty with problem application, including simple calculations and measurement problems, even though they know some of the basic facts necessary to carry out the required computations (Maccini et al., 1999).

Since mathematical vocabulary are words that label mathematical concepts, it can be argued that without understanding the vocabulary used routinely in Mathematics instruction, textbooks, and word problems, students would be handicapped in their efforts to learn Mathematics. Krussel (1998) views language as an essential part of the Mathematics construct as language is an indispensable tool in Mathematics. Students are therefore likely to face difficulties in solving word problems loaded with difficult and unfamiliar vocabulary (Abedi & Lord, 2001; Solano-Flores & Trumbull, 2003).

In algebra, generally a word problem consists of one or more sentences representing a situation or story, where the student needs to understand the elements and be able to generate a math model to represent it. According to Hsieh and Lin (2008), teachers consider that students will become more competent in solving word problems after learning more math skills. For students who can't decode text, teachers tend to adopt a passive attitude and believe that failure is a result of a mismatch of cognitive development or prerequisite knowledge (Hsieh & Lin, 2008). Furthermore, many strategies have been designed and evaluated for students in lower grades, but most are not applicable to upper level math instruction. For example, a systematic approach using concrete representations, or manipulative followed by semi-concrete representations followed by abstract representations (numbers only) has proven effective for learning basic math skills.

1.3.1 Skills required for solving word problems

1. Language skills, vocabulary skills and skill of analyzing the content.
2. Knowing the technical word specific to the content.
3. knowledge to understand the content
4. Self-monitoring, self-regulation and basic math skills
5. Problem-solving and reasoning skills.
6. Arithmetic and computational skills

1.3.2 Difficulties in learning word problems

Research has shown that many students with learning difficulties also have difficulties with language. Learner (1993) indicates that children with language disorders may also have confusion with mathematics vocabulary, for instance, the terms “minus,” “add,” and “borrowing.” In order for students to be able to complete word problems successfully, they need to understand the underlying language structure. Conventional Teaching Method of teaching that dominates our classrooms and makes teaching and learning of Mathematics uninteresting and students’ achievement in Mathematics very low.

1. Students unable to differentiate the message given in the word problems
2. Lack of motivation, self-confident, or negative attitude to learn due to bitter experiences faced by the academic failures.
3. Students with poor reasoning and problem solving skills feel difficult to solve problems in the higher level Mathematics.
4. Lack of interest make the students to become passive listeners, not having proper attention in the class, not taking any risk or any technique to solve the problems.
5. Lack of self-learning, and self-regulation during problem-solving.
6. Face problems in solving word problems due to poor arithmetic and problem solving skill.

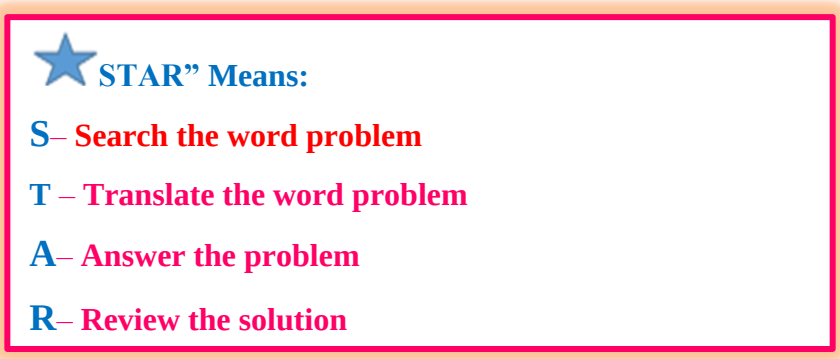
1.4 STAR STRATEGY

STAR is a mnemonic device for students with LD to improve their mathematical problem solving skills (Freeman-Green, O'Brien, Wood, & Hitt, 2015). The process of STAR involves searching the word problem, translating the words into an equation, answering the problem, and reviewing the problem. STAR is also taught in an explicit manner to students. The effectiveness of STAR has been examined, and the results indicated that it is an effective strategy in helping students with LD improve their skills to understand the problem, use the numbers to represent the words, follow the steps to solve word problems (Freeman-Green, O'Brien, Wood, &Hitt, 2015). However, a problem was found in mastery of the steps, because many students could not consistently recall the steps (Maccini P. & Hughes, 2000).

Strategies are groupings of actions, mental or physical, designed to solve a problem. (Biddlecomb& Carr, 2010, p. 2).To solve Mathematics word problems different strategies are used. One strategy for visual learners is the use of manipulative which are helpful to students

in visualizing what they are reading in the word problem. Other strategies that are used for problem solving are drawing pictures, making charts, working backwards, and guess and check (Rickard, 2005).But different Mathematics topics can be solved using star strategy. So, in this study the first letter mnemonic STAR strategy is concentrated because it equips students to complete general problem-solving steps and related sub steps. STAR lessons involve step-by-step behavioral instruction and visual prompts. It is often used for students with Autism, but it also effective with older students with mild disabilities.

Most of the students feel learning word problems is a burden and causes academic stress which create negative attitude among students towards Mathematics. Many mathematical concepts are difficult for students to fully understand. Before students are able to perform mental math or understand an abstract concept, they need to have a concrete understanding of the basic mathematical concept. STAR strategy is the best remedial measure for students with learning difficulties. This strategy consists of effective teaching component to enhance the understanding level of students and create interest in Mathematics. This strategy excite and engage students in the learning process, thus both student achievement and motivation will improve. Systematic application of this strategy with proper guidance bring academic success and ensure bright future for the students



1.4.1 Steps in STAR strategy

1. Collect information to use the strategy
2. Provide model reading by the teacher.
3. Practice by the teacher's guidance.
4. Provide Individual Practice.
5. Review and correction.
6. Knowing the general rules.
7. Follow up work.

Step-1. Collect information to use the strategy

1. Relating the known information to unknown concept.
2. Provide the reason for learning new topic
3. Link the new concept to the basic skills.
4. Combine the information related to social environment
5. Explain the steps with examples.
6. Give some activities of star strategy.

Step-2.Provide modeling by the teacher

1. Teacher reads the mathematical problem.
2. Students answer questions and write down their responses
3. Teacher prompts while students applying the strategy.

Step 3: Practice by teacher's guidance

1. Provide opportunities for students to practice the new strategy
2. Assist students until they can perform the task individually.

Step 4: Provide individual Practice

1. Provide problems for individual practice
2. Watch the students' activities.
3. Assess the students' skills in applying the strategy**.**
4. Practice the students to solve the problems related to the environment.

Step 5: Review and correction.

1. Confirmation of students' activities with Mathematics book.
2. Correct the mistakes.
3. Remedial teaching to reduce the mistakes
4. Practice students with similar problems and monitor their performance.
5. Develop confidence among the students through guidance.
6. Practice the students till to get positive feedback.

Step 6: Knowing the general rules.

1. Provide chances for the students doing different types of problems.
2. Questions to know the general rules.
3. Explain other Problem-solving situations.
4. Activities for Real-world situations.

Step 7: Follow up work.

List out the steps of star strategy or problems related to star strategy.

Steps to be followed by the Teacher in STAR Strategy

1. Individual attention to be paid by the teachers.

Students in the class room have different behavior. For example some students read loudly, some other reads slowly.so teachers give equal importance to all.

Special attention to slow learners and for students with lack of interest.

Provide peer learning and group learning to change the slow learners in to average students.

2. Motivate the students individually to apply STAR strategy.

Guide the students to read the problems carefully and translate in to mathematical activities to solve the problem.

3. Conceptualization

Different type of examples like to sum a positive and negative numbers, difference in age, degrees, height time etc. should be practiced by the students to understand the concept. Van De Walle (2001) stated, "If we emphasize only the procedural rules, there is little reason for students to attend to the conceptual justifications. Do not be content with right answers; always demand explanations".

For example

There are 80 students present in a class room. Girls are ten more than the boys. Calculate number of boys and girls in the class.

Strategy instruction (SI) in STAR strategy

There are three types of strategy instruction integrated with STAR strategy. It support the students understanding mathematical concept easily.

Concrete phase

Students represent the problem with concrete objects or visuals

***Semi concrete phase**:*

In this phase students translate the problem in to drawing or use pictorial representations of the quantities.

***Abstract Phase**:*

Students use numbers, symbols and equation to represent the problem instead of pictures. C-S-A is often integrated with meta-cognitive instruction (i.e. mnemonics) Students represent the problem with numerical symbol and equation.

1.5 ACHIEVEMENT IN MATHEMATICS

The main concern of all educational efforts is to see that the learner achieves. Quality control, quality assurance and total quality management of achievement have increasingly gained the attention of researchers in education. Achievement is the end-product of all educational endeavors. Achievement means ones attainments, accomplishment, proficiencies etc., After exploring the concept of achievement in the cognitive, affective and psychomotor aspects of human behavior, researchers have probed further and have attempted to understand the black-box of achievement.

Achievement cannot be explained by one single model that will be applicable to all, at states of education, in all places, we may have to develop models that are subject specific, local-specific and even clients specific. Academic achievement is only indicated by scores awarded to the students during examinations. The amount of success or achievement of individual in a specific field or area of accomplishment is measured by achievement tests. In the school situations an achievement test is used as a tool for measuring the nature and extent of students learning in a particular subject or a group of subjects. How far a particular student has been able to learn and acquire or has been benefited from the learning experiences given to him is ascertained with the help of these tests.

1.5.1 Factors influencing achievement

The investigator identified several factors that may be responsible for the low academic achievement of students in Mathematics.

1. Academic achievement is influenced by many factors such as home environment, SES, rural/urban differences, parental aspirations and type of school.

2. The reasons for poor achievement of disadvantaged group of children are medium of instruction, which is different from their home language and their negative perception of socio emotional climate of the school.
3. Proper study habit, motivation, field independence, creativity, high level of intelligence and reflectively foster the achievement of children in schools.
4. Poor attitude of students towards Mathematics
5. Use of traditional or conventional teaching method
6. Not using available resources for teaching
7. Students 'avoidance of mathematics
8. Lack of interest on the part of teaching staff
9. Lack of professional training
10. Lack of interest on the part of the students
11. Incompetent teachers, large classes
12. Perception that Mathematics is difficult, and psychological fear of the subject.
13. Poor performance of students was due to poor language skills and expression
14. Insufficient preparation, misinterpretation of questions
15. Inadequate technical competence and poor hand writing.

1.6 RELATIONSHIP BETWEEN ATTITUDE AND ACHIEVEMENT IN MATHEMATICS

Most research on attitudes points to the fact that attitude plays a crucial role in learning and achievement in mathematics (Zan and Martino, 2007) hence determines the student's success in the subject. It determines their ability and willingness to learn the subject, work on a variety of assigned tasks and their persistence in the tasks available. In general, the conceptions students hold about Mathematics determines how they approach mathematics tasks leading them into either productive or non-productive orientations. In many cases, students have been found to approach Mathematics as procedural and rule-oriented. This prevents them from experiencing the richness of Mathematics and the many approaches that could be used to develop competence in the subject (Mensah et al, 2013).

Most of the researches done tried to establish of the relationship between student attitudes towards mathematics and academic achievement. Some of these studies accept the fact that there exists a positive correlation between student attitudes towards mathematics and student academic achievement. Lalitkumar, Priyankasingh(2011) found that More than 50

percent students possess favorable attitudes towards Mathematics. (2)Attitude towards Mathematics correlates with achievement. Nicolaidou and Philippou (2003), studied on attitudes towards mathematics, self-efficacy and achievement in problem solving," and asserted that when students have positive attitudes towards mathematics they would achieve better which reflect a significant relationship between attitudes and performance. It was found that negative attitudes are brought about by frequent repeated failures or difficulty in dealing with mathematical tasks which may persists if not remedied. Zan and Martino (2007), studied on Attitude toward mathematics: overcoming the positive/negative dichotomy," in Beliefs and Mathematics. Attitude towards Mathematics is just a positive or negative emotional disposition towards Mathematics. Considering attitude towards Mathematics from multidimensional perspectives, it interprets students attitude towards Mathematics as a more complex scenario characterized by the emotions that one associates with Mathematics, ones beliefs about Mathematics and how one behaves towards Mathematics. Hence determines the student's success in the subject.

Georgiou et al. (2007), showed that high achievement could serve to predict a positive attitude towards math, but such an attitude could not predict stronger achievement. However, these authors emphasize the role of teachers and schools in changing attitudes stating that, math achievement could be improved by, for example, better teaching methods, more motivated teachers or better course books, which were hoped would lead to the improvement of attitudes towards math.

Multiple strategies in teaching Mathematics

While there has been substantial research regarding teaching with multiple strategies in the elementary grades, there has been significantly less research about this practice at the middle and high school levels. Yet given the broad differences in the mathematical content, student characteristics, teacher demographics, and pedagogical approaches typically employed in mathematics courses at the middle and secondary level compared with at the elementary level, it seems reasonable to speculate that the perception of multiple strategies might also differ from the elementary to the secondary level. Indeed, a consideration of how teaching with multiple strategies might differ across grade levels raises several interesting questions. Difficulty coming up with additional solution strategies that were not prominent in the curriculum.

Manipulatives

There are many strategies and tools to help students. One strategy for visual learners is the use of manipulative. “Manipulative—physical material to support learning such as blocks or tiles—are ubiquitous in early years educational settings across cultures” (Manches, O’Malley, & Benford, 2010, p. 622). Manipulative is helpful to students in visualizing what they are reading in the word problem. They are able to concretely look at the problem and physically manipulate the materials into finding a solution. “The use of physical materials to support young children’s education can be traced back to education pioneers such as Fröbel and Montessor” (Manches, O’Malley, &Benford, 2010, p. 623).

Use of manipulates in Mathematics

Manipulatives are Physical objects used to improve mathematics achievement objects students can manipulate to explore and develop an understanding of a mathematical concept” Fractions are often an extremely difficult concept for students to understand. Manipulatives makes fractions visual and concrete, through a hands-on learning experience. Teachers can use almost anything as a math manipulative, which makes them low or no cost. Furthermore, most math textbook kits come with manipulatives so they are readily available to the teacher.

According to Rapp (2009), manipulatives have been shown to help improve both achievement and motivation in mathematics among all students, especially visual-spatial learners Using manipulatives is effective in teaching mathematics for several reasons. First, manipulatives allow children to have a hands-on learning experience. A page of abstract symbols, no matter how carefully designed or simplified, because of its very nature, cannot involve the child’s senses the way real materials can. Symbols are not the concept; they are only the representation of a concept, and such are abstractions describing something which is not visible to the child. Real materials, on the other hand, can be manipulated to illustrate the concept concretely, and can be experienced visually by the child.

Many mathematical concepts are difficult for students to fully understand. Before students are able to perform mental math or understand an abstract concept, they need to have a concrete understanding of the basic mathematical concept. Manipulatives allow students to see and touch the materials that represent mathematical concepts, which make these concepts real and concrete. Like games, research has shown that manipulatives improve student achievement in mathematics. There have been many case studies done to analyze the

effectiveness of manipulatives in mathematics instruction at the elementary and intermediate levels. Manipulatives were effective because they created an external representation of the mathematical concepts being taught. They also increased student motivation and aided in forming internal understanding when some understanding of the mathematical concept was already present. Therefore, teachers need to be aware of how to use manipulative in teaching and it should be used as a tool to improve understanding when some understanding of the concept already exists.

Drawing Pictures

Other strategies that are used for problem solving are drawing pictures, making charts, working backwards, and guess and check (Rickard, 2005). Students who are visual learners will benefit from the strategy Drawing Pictures. This makes the problem more concrete and real for the student. Making charts is a method that is good for organizing data to find a solution. Mathematical problem solving strategies are taught with the instructional purpose to produce positive results.

These strategies are not meant to overload the students' learning capacity. There are meaningful skills that every student should receive from their teacher. Quality mathematics instruction "should equip the students with declarative and procedural knowledge and skills and allow them to gradually grow independent" (Cotic & Zuljan, 2009, p. 307). Students equipped with these skills will have more knowledge of how to independently solve mathematical word problems. Problem solving is the foundation for a stronger understanding of mathematics. After researching the history and importance of problem solving it is evident that there is more of a need for influential teaching strategies and practices. Students can have success with mathematical problem solving and feel positive about themselves and their results.

Interactive whiteboard

Interactive whiteboard is a solid board with a white, matte surface that looks very similar to a dry erase board. The board usually has an arm extending from it holding a digital projector that projects the image of the computer's desktop onto the matte surface. Interactive Whiteboard (IWB), as the name reveals, is a white electronic board, touch sensitive, used as a presentation device and a casual board for writing or drawing. IWB itself is a projection surface, not a monitor and can only display what a projector displays onto it (SMART

Technologies, 2010, p. 138). This white board is connected via USB port or wirelessly to a computer with appropriate software such as web browser or Active Inspire, and a projector; all of which are connected to electricity. Other tools can be connected to the board such as tablets.

Through the digital projector, the computer screen is displayed on the whiteboard, which, consequently, becomes the screen and all applications on the computer can be controlled by touching the board by finger or with other accessories such as an electronic pen and making changes in real-time. Everything written or drawn on the board and all annotations or actions can be saved to and printed from the computer (Schmid, 2008).

The teacher uses the large touch surface to interact with the computer and the interactive whiteboard software that comes with the device. An interactive whiteboard allows a teacher to manipulate text and images in real-time, as well as make annotated notes on projected content that can be viewed and saved for students to review later. With a large viewing surface, the interactive whiteboard provides a central location in the classroom for students to observe and interact with content. This allows the entire class to focus on a singular point and promotes student-centered group interactions. An interactive whiteboard, in conjunction with its software, allows teachers to make fully interactive pages that can animate, display documents, link to websites, view movies, and allow annotation on documents and web pages.

Harris (2005) lists three types of interactive whiteboards. These types reflect the stages that this new technology has passed through. The first type of IWB consists of an infrared/ultrasound kit that can be fixed to an existing traditional whiteboard. This IWB does not have the same number of functions as an active whiteboard. A simple lacking feature is the inability to save any new notes to the lesson; once the kit is turned off, nothing is available except what is written on the board. The second type is a passive whiteboard that is sensitive to finger manipulations and has more functions than an infrared kit.

The last one, which is the most recent, is the active whiteboard, which can be used with both a special pen and a human finger. The pen or other object acts like a mouse on the screen, allowing the user to operate the computer from the board. This kind of interactive whiteboard has the most functions especially with the type of software used. In addition, a

whiteboard can be portable or fixed. The majority of boards in classes are fixed. However, portable boards need to be set up again and calibrated each time when it is carried to another place. IWB also comes in different sizes, but the most common one is 190 centimeters in width. This standard size is the most preferable since it ensures clear visibility in majority of classes.

Video lesson

The widespread use of video in education during the past decade was made possible by the ready-to-use camera available in mobile devices, free streaming media hosting and sharing platforms, and recording studios available on many campuses. The rapid advancement of video technologies has made available a large variety of design options. According to Hansch et al. (2015), there are nine types of instructional videos, when defined by their affordances of learning, and there are 18 video production styles. Since courses vary greatly regarding subject matter, learning goals and objectives, and students, instructors have to make deliberate decisions on selecting and leveraging the most appropriate available technologies and resources to create videos that help students achieve desired learning outcomes. Hence, there is a growing need to develop research-based principles for designing instructional videos to support learning (De Koning, Hoogerheide, &Boucheix, 2018; Hansch et al., 2015; Kay, 2012; Poquet et al., 2018).

Many of the research studies on instructional video draw heavily on instructional design theories, such as the cognitive theory of multimedia learning (Mayer, 2009) and cognitive load theory (Sweller, 1988), as a general framework for design considerations (Fiorella& Mayer, 2018; Poquet et al., 2018). These studies have primarily focused on examining how information should be presented in a video and how learning from instructional video could be supported by engaging learners with exercises or other learning tasks (De Koning et al., 2018; Poquet et al., 2018). The findings of the studies have established several evidence-based principles for the effective design of instructional video regarding how to present visual and verbal information for optimal learning—for example, the segmenting principle, pacing principle, and signaling principle (De Koning et al., 2018; Fiorella & Mayer, 2018). On the other hand, researchers are urged to investigate novel principles for designing instructional video because the “traditional” principles identified do not necessarily suffice as technological advancement enables new design possibilities and instructional video is used in new educational contexts (De Koning et al., 2018).

Advantages of Video lesson

1. One obvious advantage of reporting results in video, rather than written form, is the potential such reporting strategies have for making research reports more engaging—and more accessible—for nonacademic audiences.

2.Another advantage of video is how quickly and efficiently it conveys information. It has been said a picture is worth a thousand words.

3. Video also allows a researcher to present several images in sequence along with sound from interviews (as well as ambient sounds) to create an immersive experience for the viewer. Such a visceral experience can potentially lead to deeper understanding of the information presented.

4. The benefits of video media according to (Prastowo, 2018), thus are:

a. Providing learners with unexpected experiences

b. Show something in real life which at first was unlikely to be able to views

c. Analyzing changes in period specific time

d. Providing experiences to learners to feel a certain circumstance

e. Presents case study presentations about actual lives that can spark learner discussions.

The Principle of media Production using VISUALS (Mukminan&Herminarto, 2008), they are:

a. Visible

b. Interesting

c. Simple

d. Useful

e. Accurate

f. Legitimate

g. Structured

The Importance of Media in the Learning Process using the VISUALS principle

The teaching and learning process is often faced with abstract material and in beyond the daily experience of learners so that the subject matter becomes difficult to teach by teachers and also difficult for learners to understand. Media is one way that can be done to concretize something abstract. So it is importance to product the visible video to all circles and acceptable to all levels of education.

It is undeniable that multi-media technology is able to make a big impression in the field of learning media. This is because it can integrate text, graphics, animation, audio, and video. Multimedia media has developed a teaching process and learning in a more dynamic direction. But more important is the understanding on how to use the technology more effectively and can produce ideas for teaching and learning.

In the past, when information technology, was not yet develop, learning process usually takes place at a certain place and time. The learning process is a process of communication between teachers and students through Verbal language as the main medium in delivering the subject matter. Process learning depends on the teacher as a learning resource. In such conditions there will be a learning process when there is a teacher; without the presence of the master inside. Classes as a learning resource then there can be no learning process. Teacher attendance in the classroom really determines the occurrence of the learning process.

Nowadays when science and technology are developing very rapidly, participants Students can learn anywhere and anytime according to their interests and learning style. Under these conditions the teacher no longer acts as the only source of learning, however, it acts as a learning designer. Teacher it is required to be able to design learning by utilizing various types of media and appropriate learning resources so that the learning process can take place effectively and Efficient. As a designer, the teacher plays a role in designing so that students get learning experiences.

PowerPoint Presentation

Power Point. Presentations are created in a series of PowerPoint slides. Users can import audio, video, graphics and text into PowerPoint to make interesting and dynamic presentations. It has been frequently used in education due to its ability to demonstrate and clarify information (Oommen, 2012). Today, PowerPoint presentation is a conventional lecture aid in higher education and is recurrently used to visually present the main points of classroom lectures. It can run on both laptop and desktop computers and can be displayed via three ways: (1) a regular computer monitor; (2) an ordinary television set; (3) a special projector. The regular computer monitor suits individual work. One student can view a presentation to practice or revise material at his or her own pace. The projector can be considered the best for displaying a PowerPoint presentation for large number of audience

since it offers a clearer and more accurate vision especially if the room light is adequately dim and a screen rather than a blank wall is used for projection.

The teacher can move the presentation slides from somehow far distance. However, plugging the computer into the set is not always an easy task. When creating a presentation, users design a slide that they will generally present to an audience or print as a handout or manual. To present a PowerPoint document, users often use a projector and screen rather than show the presentation on a desktop or laptop. Users can also write notes underneath the slide to draw upon as reminder points during the presentation. The audience cannot see the notes on the screen. Users can animate the screen, setting it up so that portions of the slide appear on the screen at timed intervals. Animation can be useful if the user has an abundance of information on the screen and wants to avoid a cluttered effect. There are primarily two types of mode in PPT: audio mode and visual mode. Audio mode includes music or sound; visual mode includes bullet points, images, graphs and color and it is of three types: verbal mode, combination of image language mode and mode of image.

Rules for effective PowerPoint presentation

There are many rules to be followed for preparing effective PowerPoint slides which bring fruitful results if it is delivered properly. Pratt (2003) stated seven rules for obtaining an effective PowerPoint presentation.

(1) PowerPoint shouldn‘t be used as a mere channel of information delivery, but rather a medium for mutual open communication with learners.

(2) There should be a balance between slideshow and audience engagement and discussion.

(3) Bulleted phrases or words on each slide should abide the third rule which states that each bulleted slide should comprise a maximum of seven lines with not more than seven bullets and not more than seven words per bullet. This is because comprehension of messages increases significantly with decreased information load (p.23).

(4) Non-bulleted slides shouldn‘t exceed three lines with a maximum of seven words per line unless they show long, direct quotes and complex formulas, and in case they involve images, charts and/or data, these should be simple and precise.

(5) It is advisable to use a large lettering on a flip chart besides the slideshow if the audience is less than 20.

(6) Display bulleted items in each slide consecutively instead of displaying the whole slide at once with a click

(7) The presenter should try his/her best to be different in a way or another from the standard. Accordingly, a presenter should interact with the audience at the cognitive and emotional levels rather than merely dictate content in words, graphics, or images.

Advantages of PowerPoint Presentations

PowerPoint presentation ……..

1. Can be used by the teacher for instruction, practice, drilling, games, reviewing and testing and used by the students for tests.
2. Can be used to receive feedback in the instruction level and to devise assignments that required students to perform in a critical or creative way.
3. Makes the instruction more organized, interesting, enjoyable and time saving.
4. Helps the teachers to save lessons, use them again, and modify them if necessary.
5. Elucidates areas of misunderstanding and difficulty to students in a logical way which improves students' performance and motivates students and enables them to be involved in language experience.
6. Facilitates the practice and integration of the four language skills in a stress free classroom environment.
7. Can be used to explain new ideas and concepts to students, structure the content and processing of a lesson.
8. Allows learners to detect main ideas and acquire an organized way of thinking by the layout of designing a title and bullet points on the slide.
9. Enhances the value of idea presentation, clarifies intricate materials.
10. Helps learners to pay attention and recall much of what is displayed on the slides of this theory.
11. Increases the attractiveness of the information which leads to effective learning for students due to the link between imagery and verbal representations.
12. Enables learners to focus and recall much of what they see on these slideshows.
13. Make students to score better in tests than the conventional lectures.
14. Foster direct interaction between teachers and learners as opposed to traditional teaching.
15. Appeal to learners' diverse learning styles due to the variety of presentation modes such as visual, aural and kinesthetic modes.

16. Can play as a multimedia materials such as audio and video content, color, animation, interactive diagrams, embedded links to useful websites and hyperlinked examples and activities.
17. Deepens the learning experience of ESL learners and to comprehend content in a better way.
18. Promote a clear and concise organization of thoughts, and grab audience attention by triggering the five senses.
19. Allows for an engaging and interactive learning environment that boosts student learning outcomes.
20. Creates interest, motivate learning environment and lifts students‘ attitudes towards learning.

1.7 NEED AND SIGNIFICANCE OF THIS STUDY

The investigator analyzed the achievements of VIII std students in the word problems of Algebra in different schools and found out that more students faced problems in this area. The investigator discussed with many Mathematic teachers to find out the causes for low achievement and lack of interest in Algebra. It was found out that poor performance in Mathematics is due to the difficulty of the students to understand the abstract concepts of word problems in Algebra. Many students feel Algebra is a difficult topic, largely as a result of the way of teaching. Class room teaching consists of mastering formulas; these students do not understand the steps.

In the teaching-learning process teachers make the mistake of following a single strategy to teach various concepts .Teachers have to face the challenge of modifying their role in creating interest among the students towards Algebra and improve the academic achievement of students. Instead of clinging to only one strategy if more than one strategy is followed by the teachers the teaching-learning process is more fruitful and successful.

The same methodology adopted by the teacher to all the types of students makes student’s interaction is limited .The teacher talk and the students listen and write. According to Brown (2003) the teacher is responsible for thinking and the students memorize and recite. Teachers focused on content, schedule and standard, not the needs of the students. To rectify the weakness, deficiency and learning difficulty in the acquisition of knowledge, the concepts should be taught by the teacher adopting suitable strategy. So the researcher intended to use

STAR Strategy to overcome the problem of poor performance of students in the word problems of algebra in Mathematics. Hence a study is required to find out the whether there is any effectiveness of STAR Strategy in teaching word problems algebra.

1.8 STATEMENT OF THE PROBLEM

Mathematics is an important subject in everyday life. Many students feel Mathematics is a difficult subject largely as a result of the way of teaching. Low achievement is caused due to the lack of interest in the subject. In the school situations an achievement test is used as a tool for measuring the nature and extent of students learning in a particular subject or a group of subjects. There is a close relationship between attitude and the levels of achievement of students. Negative attitudes and poor achievement in Mathematics are not created simply because of the nature of the subject. Poor teaching strategies such as skill and drill, copying from the board, and memorizing formulas create low motivation in students which in turn leads to low academic performance. Teachers need to avoid these monotonous traditional approaches in order to create a more positive view of math in their students.

To enhance the achievement level of students in the word problems of algebra in Mathematics, proper learning environment should be created by adopting appropriate strategy. To find out the effectiveness of STAR strategy on the achievement of VIII std students in Mathematics, the researcher has intended to entitle the study as "**The study on impact of STAR Strategy on the achievement of VIII std students in the word problems of algebra through video lesson".**

1.9 OPERATIONAL DEFINITIONS OF THE KEY TERMS

STAR Strategy

STAR is a mnemonic device for students with LD to improve their mathematical problem solving skills (Freeman-Green, O'Brien, Wood, & Hitt, 2015). The process of STAR involves the following steps

1. Searching the word problem
2. Translating the words into an equation
3. Answer the problem and
4. Review the solution.

Achievement

Achievement is a progress that a learner makes in learning, often measured by either standardized or teacher made test. Achievement in this study means the percentage of marks obtained by the students in mathematics.

VIII std students

VIII std is the last grade before high school. VIII std education falls under the middle education system and the curriculum for VIII std students typically includes subjects such as Mathematics, Science, Social Science, Tamil and English subjects.

Word problems of algebra

In algebra, word problems are mathematical problems consist of ordinary words instead of mathematical symbol and describe a realistic situation to be solved using mathematics. To solve the algebraic word problems the students should have the ability of creating equations and solve them.

1.10 OBJECTIVES OF THE STUDY

The following objectives are framed for the study.

1. To find out the achievement pre-level of VIII std students in the word problems of Algebra in Mathematics.
2. To find out the impact of STAR strategy on the achievement of VIII std students in the word problems of Algebra in Mathematics.
3. To find out whether there is any significant difference between the post-test scores of control group and experimental group students.
4. To find out whether there is any significant difference between the post-test scores of experimental group students in the word problems of Algebra in Mathematics with respect to gender.
5. To find out whether there is any significant difference between the post-test scores of experimental group students in the word problems of Algebra in Mathematics with respect to birth order.
6. To find out whether there is any significant difference between the post-test scores of experimental group students in the word problems of Algebra in Mathematics with respect to study habit.

7. To find out whether there is any significant difference between the post-test scores of experimental group students in the word problems of Algebra in Mathematics with respect to type of family.
8. To find out whether there is any significant difference between the post-test scores of experimental group students in the word problems of Algebra in Mathematics with respect to parents' educational qualification.
9. To find out whether there is any significant difference between the post-test scores of experimental group students in the word problems of Algebra in Mathematics with respect to parents' occupation.
10. To find out whether there is any significant difference between the post-test scores of experimental group students in the word problems of Algebra in Mathematics with respect to parents' annual income.

1.11 HYPOTHESES OF THE STUDY

The following hypotheses were framed for the study.

1. There is no achievement of VIII std students in the word problems of Algebra in Mathematics.
2. There is no impact of STAR strategy on the achievement of VIII std students in the word problems of Algebra in Mathematics.
3. There is no significant difference between the post-test scores of control group and experimental group students.
4. There is no significant difference between the post-test scores of experimental group students in the word problems of Algebra in Mathematics with respect to gender.
5. There is no significant difference between the post-test scores of experimental group students in the word problems of Algebra in Mathematics with respect to birth order.
6. There is no significant difference between the post-test scores of experimental group students in the word problems of Algebra in Mathematics with respect to study habit.
7. There is no significant difference between the post-test scores of experimental group students in the word problems of Algebra in Mathematics with respect to study habit.
8. There is no significant difference between the post-test scores of experimental group students in the word problems of Algebra in Mathematics with respect to parents' educational qualification.

9. There is no significant difference between the post-test scores of experimental group students in the word problems of Algebra in Mathematics with respect to parents' occupation.
10. There is no significant difference between the post-test scores of experimental group students in the word problems of Algebra in Mathematics with respect to parents' annual income.

1.12 SCOPE OF THE STUDY

The study is restricted to find out the impact of STAR strategy on the achievement of VIII std students in the word problems of Algebra.

1.13 DELIMITATIONS OF THE STUDY

1. The study is limited to VIII std students in Government higher secondary school Thiruvarangulam and Government higher secondary school Manjanviduthi only.
2. The present study is carried out on the sample comprising 80 students from VIII std under controlled conditions. 40 students for experimental group and 40 students for control group were selected randomly from VIII std.
3. The study is limited to certain concepts selected from algebra in Mathematics at VIII std level.
4. The medium of instruction selected is Tamil medium only.
5. The achievement tool designed by the researcher in Tamil version is used for the study.
6. The word problems of algebra are taken for the present study.

1.14 ORGANIZATION OF THE STUDY

The present study consists five chapters. The first chapter Introduction contains the details about the conceptual frame work of the study. In the second chapter Review of related literature are presented. In the third chapter methodology adopted for the present study is explained. The fourth chapter deals with data analysis and interpretation consist of different type of analysis used for the present study. The fifth chapter explained the Findings, discussion of results, implications and Conclusion of the study. After the fifth chapter Bibliography is presented .and Appendices are given at the end of the study.

Chapter - I - Introduction

In this chapter, introduction to the study, word problems, STAR strategy, achievement, relation between attitude and achievement, need and significance of the study, statement of problem, operational definition of the key terms of the study, objectives, hypotheses and delimitations of the study are presented.

Chapter - II – Review of Related Literature

This chapter gives a short review of the past studies. Studies related to instructional strategies, word problems, mnemonic devises are presented.

Chapter-III – Methodology

This chapter deals with research design, research procedure, population and sample, research tools, statistical techniques used for the study and data collection are given.

Chapter-IV – Data Analysis

This chapter deals with data analysis related to impact of STAR Strategy on the achievement of VIII std students in the word problems of algebra in mathematics.

Chapter - V –Findings, Interpretation, Discussion, Conclusion

This chapter deals with findings, interpretations, discussion of results, implications, recommendations and scope for further research are given.

Bibliography

This chapter contains reported bibliography which gives a clear picture of dissertation, books, thesis, projects, journals and online materials referred for this study.

Appendices

Students' personal data sheet, tools used for this study are attached.

1.15 CONCLUSION

The details regarding the conceptual frame work of the present study in different topics are presented in this chapter. Details of word problems, STAR strategy, achievement, relation between attitude and achievement, Need and significance for the study, Statement of problem, Objectives, hypotheses, and delimitation explanation of key terms are explained. Organization of the study is given at the end of this chapter.

Chapter-II
Review of Related Literature

CHAPTER – II
REVIEW OF RELATED LITERATURE

CHAPTER II

REVIEW OF RELATED LITERATURE

2.1 INTRODUCTION

Research in mathematics education has extensively explored the integrated strategy in the classroom to teach mathematics. The first and important step in the research process is to collect the past studies related to the present study and gain knowledge about the methodology, framing objectives, methods of research appropriate to the problem, selection of tools and statistical analysis is absolutely necessary. Previous researches open up new avenues in different perspectives of the investigator to conduct the current research successfully without any duplication of the previous researches.

The focus of STAR strategy related literature is on the development of students' mathematical achievement. Review of literature pertaining to a problem makes the researcher familiar with the summary of previous research and the writings of recognized experts with what is already known, what is still unknown and untested and thus provides a background of the present study. Thus for any investigator, the study of literature related to his / her filed of current investigation is essential. Such reviews provide ideas, theories, and explanations of hypothesis valuable in formulating the problem. The investigator collected review from PhD thesis, research journals, articles, books, for the present study. Considering the different ideas and suggestions about integrated strategies, mnemonic devices and many studies were reviewed, the abstract were collected and presented under different categories in this chapter.

2.2 STUDY RELATED TO INSTRUCTIONAL APPROACHES

2.2.1 STUDIES IN ABROAD

AlharbiAwatif Abdullah M and Cuihong Yang(2019) studied the Impact of Active Learning on Mathematical Achievement: an Empirical Study in Saudi Arabia Primary Schools.

The research focuses on scientific instructional approaches which take into consideration the impact of such factors as influence and motivation and thus can help provide guidance on practical classroom techniques that can help in fortifying the students' success in mathematics. The paper investigates ways to achieve better math results among

students by stimulating their motivation using active learning paradigm. The study aims to explore the methods of active learning applied in primary school math classes. Our results appear to add to the literature supporting the supposition that active learning has a direct effect on the students' success and consequently, their achievement. We provide empirical evidence for factors predicting higher math learning achievement, and accordingly, propose an improved student-centered active learning teaching method to help students develop higher-order problem-solving skills, comprising of a combination of previously verified strategies which help to foster a positive attitude towards mathematics.

RaziaNoree and Abdul Majid Khan Rana(2019)studied on Activity-Based Teachingversus Traditional Method of Teaching in Mathematics at Elementary Level.

The aim of this research was to study the effect of activity-based teaching and traditional method of teaching on students' achievement in the subject of Mathematics at elementary stage.

The research was experimental based on pre-test, post-test control group design. Two units of geometry were selected from seventh grade Mathematics for this research. Population of the study was the 120 students of seventh grade from GGHS Bhedian Pattoki, District Kasur, Punjab (Pakistan). Sixty students of class seventh were taken randomly from Govt. Girls High School Bhedian Pattoki, District Kasur. A pre-test was administered on them for equalizing the groups. Students were randomly divided into two groups (experimental and control) according to the results of pre-test. Both tests were developed from the seventh class Mathematics book for the compilation of data. Activities were used for experimental group only and other group was taught traditionally. Time for the teaching Mathematics was 40 minutes daily to each group. Independent sample *t*-test was applied on the pre-test and post-test scores to check whether there is a difference in the performances of two groups.

It was also concluded that students taught through activity based teaching performed better in post-test. It is recommended that in future Mathematics may be taught with activities at elementary level. Mathematics kit containing material for activities may be provided to Mathematics teachers.

Peter AsieduDanquah (2017) Conceptual and procedural instruction: mathematical teaching Approaches and strategies in an urban middle school.

The purpose of this qualitative research study is to describe which methods and strategies can help to improve students' achievement in mathematics in under resourced urban middle schools. The significance of this study is to develop math instructional skills in urban schools that can help bridge the achievement gap between urban underperforming schools and suburban achieving schools. Urban mathematics educators are content-ready and state-certified, but they lack certain key techniques and strategies that will help teachers succeed and students learn effectively and efficiently.

Two questions were answered in this survey: in answer to the first question, the educators characterized conceptual and procedural math teaching methods, while in answer to the second question, the instructors answered questions on teaching strategies and pedagogies that help improve the quality of math instruction at the middle school level. Twelve math educators were asked eleven, semi structured, face-to-face questions. The conceptual framework supporting this research includes professional development schools, project-based learning, and transformational leadership.

The conclusions that were drawn after the study can be categorized into three parts: First, the educators who were surveyed believe that conceptual learning is characterized as teaching students to apply the math concepts and theories that they have learned. Secondly, procedural learning is associated with the memorization of math facts and formulas. Lastly, certain practices ensure quality math instruction, including positive behavior intervention support, professional development, professional learning communities, response to intervention, teacher professional development schools, using curriculum maps and pacing guides, the use of technology in the classroom and using project-based learning methods.

Song A. An (2017) studied on Pre-service teachers' knowledge of interdisciplinary pedagogy: the case of elementary mathematics–science integrated lessons.

The purpose of the study is to explore how elementary pre-service teachers' mathematics–science integrated teaching strategies changed as a result of participating in exemplary interdisciplinary activities with multiple themes across school curricula.

The participating elementary pre=service teachers (n = 28) were recruited for this study from the College of Education students enrolled at a medium-sized southwestern research university in the United States. A qualitative methodology with pre-and post-data collection from open-ended surveys was used in the current study to explore the development of pre-service teachers' mathematics teaching strategies with connections to science themed activities before and after an 8-week intervention.

In general, the results from the pre-and-post surveys revealed that the pre-service teachers' interdisciplinary knowledge of using science themed activities as instructional approaches for teaching mathematics had remarkable changes across all four science content areas including physics, chemistry, biology, and environmental and space science. This study provided additional empirical evidence on how contextualized mathematics educational activities, in the current case using the association between science and mathematics, can be used as effective teacher education resources for developing teachers' capacity for designing mathematics lessons.

AbirAbdallah(2015) studied the Effects of the Interactive Whiteboard and PowerPoint Presentation on the Writings and Attitudes of EFL Lebanese Learners.

The present study aimed at examining the use of the Interactive Whiteboard (IWB) and the PowerPoint presentation (PPT) in pre-writing activities and their respective effects on the development of ideas and the use of topic-related vocabulary words in the writings of Lebanese English Foreign Language students. It also investigated the Lebanese English as a Foreign Language (EFL) students' attitudes towards writing when the IWB and PPT were employed in pre-writing activities.

The current study studied the progress of three control groups (n = 69) and three experimental ones (n= 65) in three secondary public schools in Beirut which teach English as a first foreign language. The participants in both, the control and experimental groups, were asked to write about the same writing prompt in order to identify their writing performance before they received any prescriptive treatment. Afterwards, the control group received traditional prewriting instruction in which the teachers developed ideas with the students about the writing topic and introduced topic-related vocabulary words as pre-writing activities

through traditional instruction. The experimental group, on the other hand, received prewriting instruction via IWB and PPT which provided students with pre-writing activities that enabled them to develop adequate ideas about the writing prompt and to acquire topic-related vocabulary words. The data collection comprised the participants' pre-posttest scores, three questionnaires, interviews with the teachers of experimental groups, and PMI inventories. Quantitative data were analyzed using the SPSS, and content analysis was conducted with qualitative data.

Findings of quantitative as well as qualitative data analysis indicated the effectiveness of the IWB and PPT in enhancing students' development of ideas and proper use of vocabulary words in essay writing. They, also, reported positive attitudes of students towards the use of IWB and PPT in prewriting instruction and towards writing when the IWB and PPT were used in the writing class.

Benson NjorogeWanjiru (2015) studied the Effects of Mathematical Vocabulary Instruction on Students' Achievement in Mathematics in Secondary Schools of Murang'a county, Kenya. The purpose of the study was to explore the influence of mathematical vocabulary instruction on students' Mathematics achievement.

The study was a non-equivalent control group pretest-posttest quasi-experimental design. The target population was 98,200 students from 257 secondary schools in Murang'a County. It was conducted in two purposively selected secondary schools in the County. The study sample was 216 Form Two students and 6 Mathematics teachers. Both the experimental and the control groups consisted of 54 students from each school. The experimental groups were taught mathematical vocabulary using the Graphical Organizer based on the Frayer Model with ICT integration instructional approach for 10 weeks while the control groups were taught mathematical vocabulary using the definition-only method for the same period. The study employed 7 instruments namely: Students Mathematics Attitudes Questionnaire, Pre-test Students' Mathematics Vocabulary Test, Post-test Students' Mathematics Vocabulary Test, Students' Mathematical Vocabulary Dictionary, Pre-test Students' Mathematics Achievement Test, Post-test Students Mathematics Achievement Test and Mathematics Teachers' Questionnaire to collect both qualitative and quantitative data. Data was analyzed using one-way ANOVA, independent t-test and paired t-test. The statistical significance of the results were then examined at $\alpha = 0.05$ statistical confidence level.

The findings indicated that there was a positive association between mathematical vocabulary instruction and students' performance in Mathematics, there was a statistically significant difference between the students' performance in Mathematics for the group taught Mathematics vocabulary using the Frayer Model and those taught Mathematics using the definition-only method, the students' attitude towards Mathematics improved due to exposure to the Mathematics vocabulary instruction and the most effective strategy for mathematical vocabulary instruction was the use of Graphical Organizer based on the Frayer Model with ICT integration because it is learner centered. A prototype lesson for mathematical vocabulary instruction based on the Frayer model with ICT integration was developed. The study recommends the use of Frayer Model with ICT integration as an instructional strategy for Mathematics based Vocabulary instruction and a further study to investigate the effects of social language (motivation) on students' performance in Mathematics.

Nicole Elizabeth Yemothy (2015) studied on Improving Educational Technology Integration in the Classroom. This study investigated the technology integration barriers that educators faced, the training the educators received, and support needs of educators at a large, prominent, 30-year old international school located in Central America offering grades Pre-K 3 to 12.

The social learning theory of Bandura, the constructivist theories of Piaget and Dewey, and the technology construction is of Paper provided the theoretical framework. The research questions focused on understanding technology integration by assessing key aspects of the teachers' technology proficiency and needs. A non-experimental quantitative cross-sectional study design was used to examine the educational technology integration practices and deficiencies at the focus school. A Likert-style instrument, comprised of parts from 3 existing instruments, was completed electronically by 62 purposefully sampled certified teachers at the focus school.

Descriptive statistics identified technology integration levels, training factors, and support needs of focus school educators. Correlational analyses failed to reveal any significant relationships between technology integration levels of the focus school teachers and the variables of interest: self-perceived barriers to technology integration, self-perceived confidence using technology, and participation in onsite professional development.

In light of the survey findings, a 3-phase technology integration improvement plan was designed. The study yields social change for the focus school by improving their technology integration practices based on empirical evidence.

Mauro De Vita, Lieven Verschaffel, and Jan Elen (2014) Interactive Whiteboards in Mathematics Teaching. An interactive whiteboard (IWB) is a relatively new tool that provides interesting affordances in the classroom environment, such as multiple visualization and multimedia presentation and ability for movement and animation. These affordances make IWBs an innovative tool with high potential for mathematics instructional environments. IWBs can be used to focus on the development of specific mathematical concepts and to improve mathematical knowledge and understanding. The aim of this paper is to review the existing literature upon the use of interactive whiteboards (IWBs) in mathematics classrooms. The reviewed studies offer a wide view of IWBs' affordances, of the more interesting didactic practices, and of the difficulties of embedding this new technology in the classroom. The capabilities of IWBs to enhance the quality of interaction, and, consequently, to improve conceptual understanding are broadly recognized. Despite these capabilities, evidence from the studies points to a certain inertia on the part of many teachers to do anything else than use IWBs as large-scale visual blackboards or presentation tools. The emerging view of how to attempt to overcome these obstacles is that there is need for greater attention to the pedagogy associated with IWB use and, more specifically, to stimulate the design of new kinds of learning environments.

Vanessa Hinton and et.al (2014) Building Mathematical Fluency For Students With Disabilities Or Students At-Risk For Mathematics Failure. It is incredibly important for students who are at-risk for mathematics failure or who have a disability which hinders mathematical performance to improve in their mathematical achievement. One way to improve mathematical achievement is through building fluency in mathematics. Fluency in mathematics is the ability to solve problems automatically and with accuracy. One method of building fluency for students who are at-risk or who have a disability includes the concrete-representational-abstract sequence of instruction that is paired with strategic instruction (CRA-SI). A brief overview is provided on CRA-SI instruction along with a review of the literature that shows CRA-SI instruction as effective instruction for students who are at-risk or who have a disability.

Elena Corina Georgescu (2013) Grade 9 Teachers Use of Technology in Linear Relationin University of Toronto The purpose of this study is to examine secondary mathematics teachers' perceptions about technology integration in teaching the grade 9 Linear Relations Unit and to investigate the impact of these perceptions and teachers' everyday practices on the development of student tasks, construction of content knowledge, and facilitation of students' mathematical communication within the context of the Linear Relations Unit in grade 9 mathematics.

Case studies were conducted with three mathematics teachers teaching in three urban secondary schools in Ontario. Qualitative data was collected through a series of ongoing classroom observations of the teachers. Additionally, interviews were conducted at the beginning and end of the data collection phase with each teacher.

The results from this study suggest that the teachers perceived that the integration of technology in the Linear Relations Unit assisted them to: 1) create interactive and dynamic learning environments which helped make the content meaningful to students; 2) guide their instruction and to closely monitor students' understanding and track their progress, by providing real time feedback; 3) help struggling students move forward in their learning when they did not master the prerequisite skills required to build upon a new math concept and to help them develop math interpretative and problem solving skills; 4) differentiate instruction and address different learning styles and skills making abstract content more tangible and helping students iii connect words to images and graphs; 5) teach students to verify and validate their answers and check for their correctness, as well as to avoid relying only on the visual aspect of mathematics; and 6) assist students build mathematical communication skills.

Lynch, K., & Star, J.R.(2013). Teachers' views about multiple strategies in middle and high school mathematics: Perceived advantages, disadvantages, and reported instructional practices. Mathematical Thinking and Learning. This paper begins the exploration of this practice by addressing the following questions: (1) What do middle and high school Algebra I teachers describe as the advantages of instruction that includes a focus on multiple strategies? (2) What disadvantages to this practice do these teachers describe?.

Analysis, based on the data from interviews (N=13) and surveys (N=79) conducted with experienced middle and secondary mathematics teachers, indicates that middle and

secondary math teachers' reported views surrounding multiple strategies appear to differ in important ways from those typically associated with teaching with multiple strategies in the elementary grades.

Michelle Dahlsten Kratofil (2013) conducted a study on A case study of a "Double-Dose" mathematics intervention. The purpose of this case study was to discover and describe the components of a "double-dose" math intervention that resulted in increased mathematics achievement for high school Algebra I. Students participating in this "double-dose" intervention were assigned to two math classes. The first math class was a regular math class comprised of heterogeneously ability grouped students. Students from the first class who needed extra support populated the second daily math class. This homogeneous group of students was involved in learning experiences in which concepts were pre-taught and retaught while addressing identified foundational gaps in math skills and developing perseverance and problem-solving skills. The data for this study were collected via student and parent surveys, instructor and administrator interviews, observations and analysis of documents. These qualitative data were supplemented by quantitative data of treatment and comparison groups acquired from state and local assessments in an effort to provide a more complete description of the intervention. This study was informed by Vygotsky's Sociocultural Theory and zone of proximal development.

The results of the study indicated that the intervention had a statistically significant impact on student achievement while the qualitative data indicated improved affective qualities such as confidence and attitude toward mathematics. In addition, triangulation of all data sources showed five critical elements for the design and implementation of similar interventions: extending and focusing the learning time, using varied instructional strategies, basing instruction on student need, building relationships and refining the selection of intervention participants.

Allsopp et al(2012) studied on Interactive whiteboard technology for students with disabilities

IWBT provides research-supported practices, including: (a) modeling concepts, processes, and skills in multiple ways; (b) engaging students to respond actively to teacher questions and prompts; (c) providing immediate feedback to student responses using individual student whiteboard presentations; and (d) monitoring student progress. Six teachers

with different experiences in teaching math participated in the study. All were first-time users of IWBT. Data was collected using observations, interviews, focus group activities, and field notes, and analyzed using coding methods according to teacher actions, student responses, and type of IWBT used during instruction. Data related to teacher actions included comments concerning actual instructional use of IWBT as well as hardware and software available in the classroom. Teacher actions were further coded in the following ways: (a) modeling; (b) providing students with response opportunities; (c) providing feedback; and (4) monitoring progress. Student responses were also collected and were coded in the following way: individual, small group, and whole class response. Students were able to respond to teacher prompts individually using the IWBT with an electronic pen or other tool.

The results were overwhelmingly positive in demonstrating the potential for IWBT in teaching math. Data showed that students' performance was enhanced due to three major features of IWBT: (a) interactive nature; (b) immediate feedback; and (c) visual display to gain student interest and attention. In addition, it was shown that modeling with IWBT occurred when concepts and skills were shown visually via projection on the IWB using teacher-developed presentations such as Power Point, and the pen feature was used to highlight or circle an important word. Student performance was shown to be dramatically improved using IWBT modeling as compared to modeling without the IWBT.

Beach, Jason S, (2012) conducted a study on Interactive Whiteboard Transition:A Case Study.

This case study examined the process teachers' use when incorporating interactive whiteboards in the classroom and daily curriculum.

Participants were drawn from a small group of three elementary and three high school teachers who received an interactive whiteboard, but no formal training. The school system purchased over300 interactive whiteboards and was not able to adequately train all of the teachers before the beginning of the school year.

Findings were compared to relevant models of andragogy, content knowledge and pedagogical techniques (TPACK) and Concerns-Based Adoption Model (CBAM). The results indicated that a teacher's prior technological ability aided in the implementation of new technologies in the classroom. The findings also indicated the importance of peer-support and

proximity when dealing with technical difficulties. There was an apparent need for a technology-specific adoption model that utilizes the technical experience teachers bring with them when they enter the classroom. The researcher introduced a working model for this process.

Klingler, Kelly Lynn, **(2012)** conducted a study "Mathematic Strategies for Teaching Problem Solving: The Influence of Teaching Mathematical Problem-solving Strategies on Students' Attitudes in Middle School"

The purpose of this action research study was to observe the influence of teaching mathematical problem solving strategies on students' attitudes in middle school.

The goal was to teach five problem solving strategies: Drawing Pictures, Making a Chart or Table, Looking for a Pattern, Working Backwards, and Guess and Check, and have students reflect upon the process. The investigator believed that students would use these problem solving strategies as supportive tools for solving mathematical word problems. A relationship from the Mathematics Attitudes survey scores on students' attitudes towards problem solving in mathematics was found. Students took the Mathematics Attitudes survey before and after the study was conducted. In-class observations of the students applying problem solving strategies and students' response journals were made. Students had small group interviews after the research study was conducted.

It was concluded that with the relationship between the Mathematics Attitudes survey scores and journal responses that teaching the problem solving strategies to middle school students was an influential tool for improving students' mathematics attitude.

Burns and et.al (2012) studied the Effects of a computer delivered math factintervention as a supplemental intervention for math in third and fourth grades.

The program was designed to enable students to apply mathematical concepts practically, hands-on and to their day-to-day lives. A total of 216 Grade 3 and 4 students (in preparation towards middle school) participated in the program, the students worked on the software at least three times a week for an 8–15-weekduration.

At the end of the course, students who participated in the workshop improved their math skills as compared to students who did not, and the intervention program was deemed very effective. After students were involved in a computer-based intervention program, they developed the following skills: conceptual understanding of the subject, procedural competency, and the ability to represent and formulate math problems mentally and to develop reasoning skills.

Jonathan D. Bostic (2011) studied the effects of teaching mathematics through problem-solving contexts on sixth-grade students' problem-solving performance and representation use.

This study examined sixth-grade students' problem-solving performance and representation use as a result of an instructional intervention. It responds to recently adopted mathematics standards (i.e., Next Generation Sunshine State Standards (Florida Department of Education, 2007); Standards for Mathematical Content and Standards for Mathematical Practice (Chief of Council State School Officers, 2010)) that indicate problem solving needs more prominence within mathematics instruction. The instructional intervention aims to supplement current efforts to enhance students' problem-solving performance and number of representations used to solve word problems.

Three sections of sixth-grade mathematics were sampled from a school in Florida; one section was randomly assigned to experience the instructional intervention. The author developed mathematics lessons intended to support students' mathematics learning of rates, ratios, and data analysis by working on word problems and engaging in content-focused and problem-solving discourse. These lessons were enacted for one month while two comparison classrooms received their typical instruction. Participants completed a pretest, posttest, and a unit test.

Data analyses within groups indicated that the intervention had a positive effect on students' problem-solving performance (d = .48) and number of representations used on the posttest (d = .42) whereas the comparison group experienced no changes. Results from multiple regression analyses indicated that intervention students solved more word problems (d = .26) and used more representations on the posttest (d = .18) than their peers. The comparison group had a higher average unit test score than the intervention group (d = .34).

Kim, T. (2010). An effective way to improve mathematics achievement in urban schools.

Differentiated instruction is a system of structuring learning that places students in groups where they are taught at their level, skill and competence in an academic subject area.

The researcher investigates the fact that two-thirds of urban or inner-city boys in schools are deficient in mathematics, part of which can be attributed to student deviant behavior in the classroom setting. Research was conducted on a group of seventh grade students that yielded certain interesting results. The students were placed in small group settings where instruction was individualized, results indicated that individualized study provided such students ample time to understand mathematical concepts, in effect, their test scores soared. In school districts with students with high numbers of deviant behaviors that are known to affect student academic performance, "one on one" tutoring improved student academic proficiency.

Manches, O'Malley, &Benford, (2010) studied the role of physical representations in solving number problems: A comparison of young children's use of physical and virtual materials.

There are many strategies and tools to help students. One strategy for visual learners is in the use of Manipulative.—physical materials to support learning such as blocks or tiles are ubiquitous in early year's educational settings across cultures" Manipulative is helpful to students in visualizing what they are reading in the word problem. They are able to concretely look at the problem and physically manipulate the materials into finding a solution. "The use of physical materials to support young children's education can be traced back to education pioneers such as Fröbel and Montessori"

Scheuermann, Deshler, and Schumaker (2009) completed a study designed to explore the C-R-A instructional sequence through explicit instruction while solving word problems.

The purpose of the study was to examine the effectiveness of C-R-A instructional sequence through explicit instruction in both general education and special education settings.

Twenty male and female students, between the ages of 11 and 14 participated in the study. Each participant was diagnosed with a learning disability and scored in the lower 25th percentile on a standardized math assessment. The study was conducted in a charter school that specialized in teaching students with learning disabilities. The procedures for the study included the use of an Explicit Inquiry Routine (EIR) (Scheuermann et al.). The EIR is a teaching routine that combines research-based or validated mathematics practices from general education (i.e., inquiry and dialogue) and mathematics practices from special education (i.e., explicit 35 instruction). A multiple-probe-across-students design was used. The intervention took place daily during a 55-minute mathematics lesson. Students were provided a lesson using the direct-teaching approach. A follow up worksheet was provided to the students; a score of 75% represented mastery. Data were collected through a pre- and post- assessment, along with maintenance probes.

All subjects made significant growth after the intervention was provided. The students' ability to generalize the skill taught during the intervention was measured and the data indicated students made significant growth in a Far-Generalization Test. It was concluded that students with math learning disabilities can increase their knowledge of math concepts through the use of direct instruction and the use of a C-R-A instructional sequence.

Axtel, Maddux, & Aberasturi (2008) examined whether there was a significant difference in student recall of information or in student verbal interaction after three modes of lecture presentation: lectures using PowerPoint versus the same lectures presented in two conventional lecture formats (lecture with overhead transparencies and lecture without visual presentation aid). Students' retention of the lecture content was measured by a multiple-choice quiz.

Findings of the data analysis showed that lectures presented by PowerPoint slides were more effective in terms of student retention than the other two formats: lecture with over head transparencies or lecture without visual aids. However, there was no difference in student duration or frequency of interaction between the modes of lecture presentation

Gorder, L. M. (2008) conducted a study of teacher perception of Instructional Technology Integration in the Classroom.

In the grade 9 applied course, students utilizing graphing calculators or graphing software could collect real data to generate a position or a velocity graph. Then, they could walk in a straight line to replicate that graph. Through investigations, students will be able to determine the characteristics of distance-time and velocity-time graphs, to interpret the graphs in terms of actual motion, and to describe "situations that would explain the events illustrated by a given graph of a relationship between two variables"

The investigator found that teachers need to learn to integrate technology within the context of their classroom through practice, reflection, and sharing of teaching practices. In order to help students construct mathematical knowledge, teachers need to use appropriate virtual tools to conduct investigations and demonstrations of math theory, to gather data for conjectures, to provide multiple representations, to exemplify connections among notions and ideas, and to create problems and situations that require and stimulate higher order thinking.

Rozalski (2008) Practice, practice: How to improve students study skills. Beyond behavior, The investigator believed the constant practicing of math skills makes one perfect. The author lists five major practices that educators can use to ensure students practice repeatedly to strengthen ones understanding of the skill. The first is improving student listening skills, as per the investigator math proficiency can be achieved by having students indulge in playing academic games, creating listening centers in the classroom as well as listening to audio books; also, identifying story sequences and recalling the order of stories through audio devices is yet another technique that will help students comprehend story problems. Sharpening the note taking skills of the student is an additional important practice that will eventually have positive effects on students' math academic achievement. It is ideal to teach students how to identify the main idea of a story or concept. It is not necessary to write all notes dictated during a lecture or class.

The investigator however, argues that students who take notes in class and read their notes have better grades than students who do not write things down and or read their notes. Yet another skill that needs to be developed is student thinking and analysis skills: teachers should assist the pupil in mastering think aloud methods and strategies as well as developing critical thinking skills by reading aloud story problems in groups and analyzing the vocabulary and math operations use din solving the problem. The fourth practice is the ability to develop memory skills: the learner must develop mnemonics and acronym recording

techniques. The last practice is reading directions; the learner should master reading directions before beginning an assignment, during multiple choice exams the student should read all possible answers before committing to choosing one.

Koeze (2007) conducted a study on Differentiated instruction: The effects on student achievement in an elementary school. Eastern Michigan University.

Learning must be tailored to the individual student's need. Students learn differently, for example, there are students who learn effectively by listening (audio), watching (visual), movement (kinesthetic) and tactile (touch or feel) or by using a combination of the mentioned learning styles. It is imperative that educators can categorize students in groups or through providing divergent learning stations that best suits the student style of learning.

An essential aspect of differentiating instruction is providing students with access to their progress in the form of data, this will help students take ownership of the learning process, boost their self-confidence while they monitor their own progress. When students have access to their data, they are empowered; it helps them learn to interpret charts and develop action plans to bridge their knowledge gaps. For instance, students might see that, when they spent more time on math problems after school, they finally mastered a challenging concept or that their performance tended to improve after they watched a video on a math concept.

Leikin, R., &Levav-Waynberg, A. (2007). Exploring mathematics teacher knowledge to explain the gap between theory-based recommendations and school practice in the use of connecting tasks.

This study aimed to shed light on reasons for the disconnection between the theoretical evidence for the importance of teaching with multiple strategies, and teachers' limited use of this practice in their instruction. Teachers' subject matter knowledge was assessed by asking them to solve several problems in as many ways as they could, and to give an example of a mathematics problem that could be solved in different ways.

The researchers interviewed twelve Israeli secondary school mathematics teachers with the goal of identifying which aspects of teacher knowledge were associated with (what

the authors referred to as) multiple-solution connecting tasks (e.g., tasks that may be attributed to different topics or concepts within the mathematics curriculum, and therefore may be solved in multiple different ways).

It was found that teachers' subject matter knowledge was "curriculum oriented," in that teachers generally described solution strategies that were taught in the Israeli school curriculum easily, but had greater difficulty coming up with additional solution strategies that were not prominent in the curriculum. In addition, when asked to produce an example of a problem that could be solved in multiple ways, teachers in their study frequently drew examples from topics for which students were required to learn multiple s trategies in the Israeli school curriculum (such as solving systems of equations and or quadratic equations), or from their memories of student-generated solutions. The researchers also asked the Israeli teachers what they perceived the potential benefits of utilizing connecting tasks in teaching to be. Among the main benefits that teachers mentioned were that this practice could improve students' problem-solving success, provide affective advantages (e.g. helping students see the beauty in math, increasing their motivation and interest in math), and develop students' reasoning skills (e.g. developing logical reasoning, developing understanding).

Xin, Jitendra, and Deatline-Buchman (2005) conducted a study to compare the effects of two mathematical problem-solving instructional approaches.

The first approach was a schema-based instructional method that consisted of two steps: (a) identify the problem type, and (b) determine the structure of the problem to be used in a schematic diagram. This method was used in an earlier study conducted by Jitendra (1996). The second approach involved the use of a general strategy. The approach was adapted from a commercial mathematics textbook. The approach had four steps: (a) read to understand, (b) develop a plan, (c) solve, and (d) look back.

The participants in the study were 22 students who struggled with academics, 18 who were identified as having a learning disability, one with emotional disturbance, and three were at risk for mathematics failure. The study took place at a middle school located in the northeast region of the United States. Word problem assessments were used to determine whether students acquired, maintained, and transferred the skill from either learning method. The results of the study indicated that students who participated in the first approach (schema-

based instruction) performed significantly better than students who participated in the general strategy instruction.

There were statistically significant differences between groups on posttest, maintenance, follow-up, and generalization test results. Findings from this study support findings from other studies examining the effects that a schema-based instructional approach has on solving mathematical word problem

Rickard, A. (2005). Evolution of a teacher's problem solving instruction: A case study of aligning teaching practice with reform in middle school mathematics.

Other strategies that are used for problem solving are drawing pictures, making charts, working backwards, and guess and check.. Students who are visual learners will benefit from the strategy Drawing Pictures. This makes the problem more concrete and real for the student. Making charts is a method that is good for organizing data to find a solution. Working Backwards is sometimes a good strategy when the problem presented does not offer a forward solution. Lastly, guess and check is always an excellent strategy to use even after you have already used a previously mentioned strategy. It never hurts to go back and check your work when solving mathematical word problems.

Silver, E. A., Ghousseini, H. and et.al (2005). Moving from rhetoric to praxis: Issues faced by teachers in having students consider multiple teaching with multiple strategies solutions for problems in the mathematics classroom.

The researcher described the results of a professional development series conducted with twelve middle school mathematics teachers implementing the *Connected Mathematics* (Lappan, Fey, Fitzgerald, Friel, & Phillips, 2009) curriculum.
Silver and colleagues found that almost all teachers in their sample expressed general support for the idea of teaching with multiple strategies at the beginning of their study, but that these teachers also expressed concerns and doubts about this approach both early in the study and as the study progressed. Among the key concerns that the teachers expressed were limited instructional time for presenting multiple strategies, the risk that lower-ability students would become confused, and the risk that displaying incorrect solution strategies could worsen students' misconceptions

Lambdin, D.V. (2003) studied the Benefits of teaching through problem solving. "To be able to solve problems, one must have deep, conceptual understanding of the mathematics involved; otherwise one will be able to solve only routine problems "Teachers believe that students need to have the background knowledge to solve not just routine problems, but also complex higher order thinking problems. To prepare students for the future and the problems that they will encounter, students need to learn mathematics through problem solving.

Many teachers are using problem solving mapping to aid instruction in problem solving. Being able to make a concrete illustration of these abstract mathematical problems can assist students of all levels. Teachers know and believe that they have to make the subject matter of mathematics relevant to their students. "A primary tenet of teaching through problem solving is that individuals confronted with honest-to-goodness problems are forced into a state of needing to connect what they know with the problem at hand" .Good teachers know their students' needs and address them. Students need a connection to the problem in order to construct meaning of the problem. "Learning through problem solving develops understanding" (through this belief that teachers continue to influence learning for all students to gain understanding. "When students appreciate the underlying structures of mathematics, their self-confidence soars and they are more willing to tackle challenging problems"

Tufte (2003) studied on The Cognitive Style of PowerPoint, PowerPoint deprives the presentation from its analytical quality. The investigator explained that the lower solution of the PowerPoint can dilute information. In other words, the limited number of words in a slide results in either shortage of information or a great amount of slides in a single presentation. Turkle (2004) commented on that by saying that a professional teacher can produce a highly effective presentation that complements his/her lecture regardless of the number of words per a slide or the quantity of slides in the whole presentation.

Indeed, a skilled teacher is the one who demonstrates a proper mélange of ideas, images, and animation in the Power Point Presentation to back up his/her lecture in an efficient way. Therefore, the investigator was imprecise in his critique, for evaluating the slides themselves away from the whole presentation. In other words, the investigator ignored the effect of the human contact of the lecturer with the audience. It is worth mentioning also

that the PowerPoint should be viewed as an instructional aid and not as a replacement of the presenter.

Owen and Fuchs (2002) completed a study designed to examine the effects of strategy instruction on solving mathematical problems with 24 third-grade students. The three-week study involved instruction on a six-step sequence to solving word problems. The six-step strategy taught to the participants followed the sequence (a) read the problem, (b) draw individual circles representing each number used, (c) draw a rectangle divided in half, (d) cross out the first circle and draw it in the left box, do the same for the second circle but place it in the right box- continuing the process until you run out of circles, (e) count the circles in each box, make sure each box has the same number of circles, and (f) count the circles in one box and record the number as your answer. The researchers used a pretest and posttest to collect data on the effect of the strategy. Student surveys and teacher surveys also were used to measure social validity.

The results of the study indicated that students who received the instructional strategy did significantly better on the post-assessment than students in the control group.

2.2.2 STUDIES IN INDIA

Eswari.N and Chinnappan.K(2018) studied on Efficiency of Teaching Learning through Interactive ICT Content.

With the development of education information, the multimedia teaching has been more and more widely used in schools, education and institutions of various levels. Multimedia teaching has many advantages of that it is convenient, vivid informative and interesting, can greatly improve the efficiency of teaching, but the improvement of teaching effects did not achieve the desired level. The expected effect of multimedia teaching cannot be achieved, and the effectiveness of multimedia teaching is faced with some suspicions. The effectiveness of multimedia teaching contains two aspects: effective using of multimedia teaching system and the effectiveness of teaching effect. We should enhance Education and direction, correctly understand and reasonably treat multimedia teaching, avoid the blindness of multimedia construction and use, increase the quality of courseware, promote teacher's professional level and classroom dynamics, organically combine traditional and multimedia teaching, and take a series of measures to improve the effectiveness of multimedia teaching**.**

Priya, J. J. (2017) studied on Mathematical Problem Solving Ability of Eleventh Standard Students.

The study aimed to examine the mathematical problem solving ability of eleventh standard students.

A sample of 810 Eleventh standard students (406 boys and 404 girls) was selected from different schools of Chennai district, using the stratified random sampling technique. Survey method of research was adapted. Mathematical Problem Solving Ability test constructed by the investigator was used to collect data from the eleventh standard students. Mean, standard deviation, 't' test, and one-way ANOVA were used to analyze the data with the help of SPSS (Version 20.0).

SenthamaraiKannan .B (2016) conducted a study on problem solving ability in mathematics of IX standard students in Dindigul district, Tamil Nadu.

The study consisted a sample 80 ninth standard students from two types of institute which are Government and private secondary schools. Problem solving ability test in mathematics was used to collect data. The investigator adopted survey method and random sampling technique was used to collect the sample.

The results showed that the level of problem solving ability of IX standard students in mathematics was average.

Kramarski et al. (2014) study that solicited versus unsolicited meta cognitive prompts for fostering mathematical problem solving using multimedia.

This research examined that: a) how student control over meta cognitive prompts in a multimedia environment affects students' ability to solve mathematical problems in immediate comprehension tasks using a multimedia program; b) it also examined the effect on meta cognitive discourse, mental effort and engagement with multimedia-based tasks. Participants were 90 from 8^{th} grade students, randomly assigned to three groups working in pairs: (a) solicited prompts group, with free access to multimedia-based meta cognitive prompts (b) unsolicited prompts group, consistently and regularly exposed to on-screen meta cognitive prompts and (c) a control group with no multimedia meta cognitive prompts.

Mixed method analysis showed that of the three groups the unsolicited prompts group had the highest effects in the immediate comprehension tasks (d = 1.23; 1.92 respectively for the solicited prompts group and the control group) and the delayed-transfer problem solving test (d = 0.55; 0.93, respectively).

The findings of the study were: a) the level of this group's meta cognitive discourse was higher, particularly in the planning phase; b) group members displayed less cognitive load on the complex tasks and were more engaged in the multimedia activities; and c) in contrast, the solicited prompts group felt they were under a heavier cognitive load than the other two groups.

Ramesha and Dr. Narayanamoorthy, M.(2012) study explored the effect of group tutorial teaching strategy on achievement in Mathematics of ninth standard students.

The study adopted an untreated control group, pre- test and post -test quasi experimental design. The sample consisted of 60 ninth standard students from private and aided institution in the year of 2011-2012. Mathematics Achievement Test (MAT) was conducted, relevant data was collected and analyzed using 't' test.

The result showed that there was a significant difference between the achievement of control group and experimental group.

Soosai Raj (2008) studied on the effectiveness of web-based classroom instruction in learning mathematics with reference to attitude, interaction and web skills of higher secondary students.

The investigator adopted pre-test treatment, post-test equivalent group experimental design in order to find out the effectiveness of web-based classroom instruction. The sample consisted of 80 higher secondary students. Purposive sampling technique was adopted. The researcher developed a web-based instruction model and also web based content as the independent variable and the dependent variables were the achievement, attitude, interaction and web skills. The variables were studied with respect to gender and subject group of the students. The tools such as achievement test in mathematics for pre-test and post-test, attitude

scale for web based classroom instruction, web based interaction scale, scale of web skills were used to gather the data.

The result of the study concluded that there was a significant difference between pre-test and post-test between control group and experimental group, and also the study revealed that there was a correlation between post-test and attitude towards web-based learning. The researcher concluded that the web-based instructional model was very effective in learning mathematics.

Meera Raj (2007) experimented on the effectiveness of Advance Organizer Model (AOM) in the teaching of mathematics among secondary school pupils at differing levels of intelligence.

The study aimed on comparing mathematics achievement of two equal groups of secondary school pupils taught on using mathematics through advance organizer model and the other using conventional method, with the differing levels of intelligence such as low, average and high. Experimental study with the design two groups, post-test only was adopted for the study. A sample of 64 VIII standard students was selected for the study. Kerala non-verbal group test of intelligence for secondary pupils, pre-requisite test, achievement test, test to measure the instructional effects-cognitive structures and meaningful assimilation of information, were used as tools to collect the data.

The major findings were, experimental and control groups on mathematics achievement test after treatment indicated that the difference in the mean scores of achievement test was significant at .01 level. Also the mean scores obtained for the experimental group was more than that of the control group in each case. The comparison of the performance of low, average and high intelligent group of pupils in the experimental and control group on mathematics achievement test after the treatment indicated that the difference in the mean post-test scores of pupils in the experimental and control groups was significant at 0.01 level at different levels of intelligence.

Lindacy, Rita Cerol (2006) an analysis of an effect of the computer enhanced curriculum and learning style on student achievement in college algebra at a Florida community college.

The purpose of this study was to investigate the effect of a computer enhanced curriculum and learning style on student achievement in college algebra.
The research design was quasi-experimental involving six intact classes at Indian River Community College (IRCC) during the fall 2005 semester (N=93). Three fulltime Mathematics faculties participated in the experimental component of this study by each agreeing to teach one traditionally based and one computer –enhanced college algebra section. The Beyond Excellence Learning styles inventory was used to assess the learning style of students. Maple TA program was used for the treatment group. Traditional method was used for control group. Two factor analysis of variance (ANOVA) with FE scores used as the dependent measure.

No significant difference was found for achievement in college algebra based on learning style, technology or the interaction of these two variables. However, further exploration of these two factors and their effect on student motivation, retention and achievement is strongly recommended.

Thiyagu, K. (2006) studied the "Effectiveness of web-based instruction in learning mathematics education among teacher trainees"

The major findings were: There was a significant difference in mean achievement scores between the students taught through traditional method and students taught through web-based instruction. Web based instruction has brought about positive impact on learning out comes. There was no significant difference in achievement scores between the experimental boys and control boys but girls differed significantly. Experimental girls had higher mean scores than the control group girls. There was no significant difference in achievement scores between the experimental and control group students of age below 25 but students of age above 25 differed significantly. There was no significant difference between the achievement of experimental and control group arts/ vocational students but science students differed significantly.

Monica (2001) conducted the study in two geometry class rooms to determine whether the use of multimedia instructional strategy could increase learning.

The multimedia instructional strategy could increase learning. The multimedia group members used power point presentation while the traditional group used the marker board, paper and pencil to make their presentations. Observation, a presentation rubric and a focus group were used to collect data for this study. Totally 39 students from two geometry classes participated.

Results indicated that both the groups increased concept learning when they used both visual and verbal explanation rather than a verbal explanation alone. The multimedia group scored higher score than the traditional group when they were given ample time to learn how to use power point It was determined that students should be given an opportunity to give both a visual and a verbal explanation for geometry topics. They should also be given enough time to learn the multimedia program before using it. Another implication is that the teacher should group students those who have little knowledge of technology with more knowledgeable students and integrate technology across the curriculum. The results were disseminated to the teachers in Mathematics department and administrators by power point presentation.

Vaidyanathan (2001) conducted a study on "Effectiveness of multimedia approach on the achievement of primary children in Mathematics" with the aim of developing multimedia package for the teaching of mathematics, and experimentation of the same with the set of children in IV standard. Finding of the study revealed that the experimental group children fared better in the achievement test than the control group children and showed that learning through multimedia will increase the achievement of children better than the learning through conventional method.

Thillaka and Pramilla (2000) studied on use of computer multimedia programme in learning trigonometry among high school students.

The main objectives were, 1. To find out the influence of computer-based multimedia programme on achievement in mathematics among high school students: (2) To find out the difference in achievement between mathematics high achievers and low achievers from both relative retention of learning in mathematics. Experimental method was adopted for the study. A sample of 62 students studying in class IX were selected for the study. The probability sampling method was chosen for the study. Attitude scale was used for data collection.

Major findings were: (1) There was no influence of computer-based multimedia programme on the achievement in Mathematics among high school students (2) There was no significant change in their attitude towards mathematics after learning trigonometry through computer-based multimedia and text-based self-study material. (3) There was no significant difference in achievement of mathematics between high achievers and low achievers for both experimental and control groups. (4) There was no significant difference in the retention of learning in mathematics between the experimental group and control group.

2.3 STUDY RELATED TO WORD PROBLEMS

2.3.1 STUDIES IN ABROAD

Kurz et al. (2017) Guiding Preservice Teachers to Adapt Mathematics Word Problems through Interactions with ELLs

In this article, the authors present a framework for guiding elementary preservice teachers in adapting mathematics word problems to better meet English language learners' (ELLs) needs.

The investigators analyze pre-service teachers' ELL adaptations implemented in a one-on-one setting. Through qualitative methods, four themes regarding implemented adaptations were identified: language adaptations, mathematical adaptations, tool/visual adaptations, and structural adaptations. The authors conclude that the framework was successful in helping pre-service teachers learn about adapting curriculum by interacting with ELLs. Implications for teacher education are discussed.

Amy E. Lein (2016) studied the effectiveness of Mathematical Word Problem Solving Interventions for Students with Learning Disabilities and Mathematics Difficulties: A Meta-Analysis.

This meta-analysis synthesized the findings from 23 published and five unpublished experimental or quasi-experimental group design studies on word problem-solving instruction for K-12 students with learning disabilities (LD) and mathematics difficulties (MD). A secondary purpose of this meta-analysis was to analyze the relation between treatment

effectiveness and various study features including (a) participant characteristics, (b) study design characteristics, (c) outcome measure characteristics, and (d) contextual characteristics of instruction.

Results of a random effects model synthesizing the 31 independent effect sizes extracted from the 28 included studies showed an overall mean effect size of 1.03 (*SE* = 0.15). Grade level of participants, type of report (published vs. unpublished), assignment to conditions, reliability of outcome measure, instructional setting, interventionist, instructional arrangement, mathematics task, and intervention duration were found to moderate treatment effectiveness. Given that effect sizes in two studies (Fuchs, Fuchs, Finelli, et al., 2004; Fuchs, Fuchs, Prentice, Hamlett, et al., 2004) were over four standard deviations above the mean, analyses performed without these two influential points produced a lower mean effect size (*g* = 0.77, *SE* = 0.10) and impacted the results of moderator analyses. Specifically, only two of the six variables found to moderate intervention effectiveness when all 31 independent effect sizes were included remained significant after removing the two influential effect sizes. Those two variables were reliability of outcome measure and intervention duration. The results extend the findings of previous meta-analysis with regard to the effectiveness of word problem solving interventions for students with LD and MD. Limitations and directions for future research are discussed.

Morin, Lisa L. (2014) "Using Schematic-Based and Cognitive Strategy Instruction to Improve Math Word Problem Solving for Students with Math Difficulties."

The purpose of this study was to examine a math word problem solving strategy, bar model drawing, to support students with MD.

The study extended previous research that suggested that schematic-based instruction (SBI) training delivered within an explicit instruction framework can be effective in teaching various math skills related to word problem solving. As a more generic schema approach, bar model drawing may serve as an effective form of SBI that can be developed across word problems. Moreover, the bar model approach has the potential to enhance students' awareness of cognitive strategies through paraphrasing, visualizing, hypothesizing about problem solutions, and checking work, all of which are explicitly taught through the use of the bar-model drawing protocol.

A multiple-baseline design replicated across groups was used to evaluate the effects of the intervention of bar model drawing on student performance on math world problem solving. Student performance was investigated in terms of increased accurate use of cognitive strategies and overall accuracy of math word problem solving. Both of these dependent variables increased and remained stable throughout intervention and remained high during the maintenance phase of the research.

Pre and post testing results were also favorable. Participants reported high social validity for the intervention. However, the results of the research also yielded some surprises and raised some questions.

Azizah Ahmad and et.al (2010) studied on Visual Representations in Mathematical Word Problem Solving among Form Four Students in Malacca.

This study examined the use of visual representations which posed great difficulties in most mathematical tasks. The sample consisted of 381 students from eight secondary schools in three different districts in Malacca. Secondary students were given the 15Mathematical Processing Instrument (MPI) adapted from Hegarty and Kozhevnikov (1999).

Results indicated that less than two percent of the problems were solved using pictorial representation and most of the students preferred and used schematics solutions.

Lopez, Lurdes, (2008) "Helping At-risk Students Solve Mathematical Word Problems Through The Use Of Direct Instruction and Problem Solving Strategies".

The purpose of this action research study was to observe students mathematical abilities and to investigate whether teaching students problem-solving strategies in mathematics enhance students' mathematical thinking and their ability to comprehend and solve word problems.

The study took place in an urban school in Orlando, Florida in the fall of 2004. The subjects was 12 eighth grade students assigned to the investigator's intensive math class. Quantitative data was collected. Students took a pre and posttest which was designed for measuring and giving practice to students on mathematical skills. Students worked

individually on practice problems, answered questions daily in their problem solving notebook and mathematics journals.

Results showed the effectiveness of the use of direct instruction and problem-solving strategies on at-risk students.

Stark, Amanda, (2008). "Writing Relevant Word Problems: Seeking to Increase Student Mathematical Achievement"

In this action research study of eighth grade mathematics, students' use of writing and solving word problems was investigated. Data was collected to determine whether writing and solving word problems would have a positive effect on students' abilities to understand and solve word problems. These word problems are grade-level appropriate and are very similar to the problems on the eighth grade online assessment of state standards.

Pre- and post-test data, weekly word problems that focus on specific mathematics topics, beginning and end surveys about word problem perceptions, and a teacher journal reveal that student engagement in this weekly practice of writing and solving word problems did influence the students' overall abilities for, achievement in and attitudes toward solving word problems. Except for some students' perceptions, the influence was largely positive. This suggests that word problems can be a constructive feature in eighth mathematics instruction.

Hsieh and Lin (2008) studied on Dynamic visual computer design for factors and multiples word problem learning.

The purpose of the study was to investigate whether integrating graphics associated with word problems into a computer-assisted learning environment would improve student achievement.

The participants were 3, 5th grade low math achievers. Graphic representations of algebraic word problems were employed using the Excel computer program. Student performance was evaluated by pre- and post-tests.

The results showed that students had significant improvement in successful decoding of textual information, so that they were able to choose correct formulas and operand symbols Furthermore, multiple representations in math learning proved to promote greater understanding of target concepts and the representations became internal to support students successfully learning problem-solving skills.

Jimenez et al, (2008) conducted a study on teaching an algebraic equation to high school students with moderate developmental disabilities

In this study, three students, ages 15-17, were observed to determine the effects of systematic instruction with a concrete representation on the acquisition of algebra skills for students with LD. Baseline data was collected after one instructional session on solving for "x". The interventions included: (a) concrete representations for solving linear equations; (b) task analysis instruction on the steps necessary to solve the equation problems; and (c) prompting with fading. Students with LD were taught to solve beginning algebra problems using modeling, manipulative, and mnemonics.

Results showed that all three students were able to master the concrete representations of an algebra equation, but that they continued to rely on manipulative to solve the linear equations. The ability to fade to symbols alone following prolonged instruction remains unknown. The results indicated that while students were able to learn the step-by-step process, they were not necessarily mastering algebraic reasoning.

Amit and Klass-Tsirulnikov (2005) focus on the world of algebra and the word problems students' encounters in algebraic situations.
From their perspective, word problems are very important because without them, students have no way to relate real-life situations to the mathematics learned in the classroom. Both reiterate the idea that students are unable to link real life and classroom mathematics. The investigator presented a three-stage method to help bridge the gap between real-life and mathematics. Step one is to create a meaningful problem setting. Step two is to create a logical structure by non-algebraic means. Step three is to accommodate algebraic techniques. Using this method, the authors encourage students to take ownership of their problems by exploring, developing, and building an approach of their own.

Even though most researchers referred to the importance of word problems in mathematics classrooms at every grade level, the above mentioned articles highlight two very important ideas; student engagement and applying concepts to the real world. Both of these relate to the NCTM standards of Communication and Connections. In comparison, the above researchers all had algebra classrooms where they were stressing the importance of meaningful word problems and how real-life connections help students develop mathematical reasoning skills. In contrast, the investigator (2005) provided a three-step method they use for students to follow when solving word problems whereas Martinez (2001) was making observations through his daily teaching.

Dr. van Garderen (2004) named very specific reasons why students struggle. She researched the use of reciprocal teaching, a method for reading comprehension, in the mathematics classroom to teach word problems. She zeroed in on the factors of irrelevant information, mathematical terminology, vocabulary level, syntactic complexity for making word problems difficult to understand. All of these factors contribute to students who struggle with understanding word problems. She found that reciprocal teaching was a non-threatening approach that allowed students to work cooperatively to support one another in their learning which further facilitated the performance of students.

Nosegbe-Okoka (2004) focused on helping students make sense of word problems. The investigator taught students at the elementary and middle school level to find a sense-making approach to word problems. According to the investigator, the problem is with the instructional practices teachers use to teach word problems. The focus of school mathematics should be helping students make connections between mathematics and real-life situations. This is the biggest reason for students avoiding word problems – they see no relevance and most word problems really do not have true-to life meaning for students. In using this method of allowing students to work cooperatively and reflect on the reasonableness of their answers.

The investigator found that students had a greater Writing Word Problems conceptual understanding because they were actually able to make sense of the problem with in the given context. From the research it was found, the reasons students struggle vary across the years from elementary through middle school, but all the above mentioned reasons have their place in the world of mathematics. In distinguishing similarities and differences among these researchers.

Leong and Jerred (2001) conducted a study to examine how children understand and solve mathematics word problems.

Specifically, the investigators inspected the effects of three characteristics of word problems as well as related features needed to solve them: (a) consistency and/or inconsistency in elementary mathematics word problems, (b) adequacy or inadequacy of linguistic information within the mathematics word problems, and (c) cognitive and memory tasks of the participants as they performed the mathematics word problems. 12 students were interviewed to understand the verbal strategies students use to solve the mathematics word problems. Ninety-one students enrolled in grades three, four, and five participated in the study. The students attended school in western Canada. Twenty-four mathematical word problems that involved 12 consistent and 12 inconsistent problems were used. The investigators defined word problem consistency as information in the word problem being presented in the order that problem-solvers prefer, in other words, accessible in the order in which the problem must be written in numeric sense to be solved. Inconsistency was defined as information presented in random patterns that conflict with the order of operation.

The students were administered the 24 problems in a quiet room within the school. Students were asked to solve each problem. Correct responses and incorrect responses were scored. The study assessment also involved 36 mathematics problems using adequate language and inadequate language. The students were asked to classify each problem with three codes: (a) JE for just enough information, (b) NE for not enough information, and (c) NN for having not needed information. If the students classified a problem as having just enough information, they were to solve the mathematical word problem and record an answer. If the students classified a problem as not having enough information, they were asked to write down a few words that would make the mathematical word problem complete. If the student classified a problem as having non-needed information, the student was asked to cross out the excess information.

Prior to the study, the students were assigned to math ability groups: (a) less able and (b) more able. Groups were compared using various assessment tools that were used to measure reading, comprehension, vocabulary, mathematics concepts, and working memory skills and abilities. With these data, an analysis of variance and an analysis of covariance were run.

The results indicated that although consistency of language within mathematical word problems plays an important function within the learning process, adequacy of information had a greater effect on whether students had the ability to solve word problems. Also, the data indicated that students considered less able did more poorly than their more able peers on both types of mathematical word problems (i.e., not having enough information and having non-needed information) at each grade level.

These data supported building language consistency and adequacy through scaffolding. Leong and Jerred (2001) suggested that consistency in language information is important for learners of mathematics word problem-solving abilities. They also maintained that when language within a word problem is inconsistent, many students will struggle with performing the task. The researchers also stressed the idea of language adequacy while teaching mathematical word problem skills.

When the language within the mathematic word problem is adequate, the information needed to solve the word problem is easily available to the solver. Problems that are classified as inadequate are those with too much or not needed information. This inadequacy within the mathematical word problem creates additional barriers that students who are just learning the solving process, should not encounter. The investigators also noted that if students still require schema-based instructional strategies for solving word problems, the language used should be consistent and adequate. Hence, when teaching students with identified mathematics learning disabilities or those at-risk for mathematics failure, it may be beneficial to use instructional approaches that take into consideration the language within the mathematical word problems.

2.3.2 STUDIES IN INDIA

Adeneye (2011) conducted a study on the Effect of Personalized, Computer-Based Instruction on Students' Achievement in Solving Two-Step Word Problems.

The purpose of this study was to investigate whether individually personalized computer based instruction on two step word problems would improve student achievement. Specifically, the study examined the effect of two levels of personalized computer-based instruction (personalized, non-personalized) on the achievement of junior secondary school year three students on two-step word problems.

The researcher found that the personalized computer based instruction is effective in increasing students' performance to solve two-step word problems. It is a catalyst for low-ability student performance to solve arithmetic problems

2.4 STUDIES RELATED TO MNEMONIC DEVICE APPROACH

The mnemonic device approach focuses on teaching students a first-letter mnemonic for self-monitoring and problem-solving Students with LD have difficulty representing problems and distinguishing relevant from irrelevant information. The mnemonic device offers one way to teach for understanding, offering students a method for making greater connections in their learning by using a concrete method. In this study), a combination of strategies, including general problem-solving strategies and strategic instruction, was used to support students with LD.

2.4.1 STUDIES IN ABROAD

Al Jupri and Paul Drijvers (2016) investigated student difficulties in Mathematizing word problems in algebra.

The investigators carried out a teaching experiment involving 51 Indonesian students (12/13 year-old) who used a digital mathematics environment. The findings were backed up by an interview study, in which eighteen students (13/14 year-old) were involved. The perspective of mathematization, i.e., the activity to transform a problem into a symbolic mathematical problem, and to reorganize the mathematical system, was used to identify student difficulties on the topic of linear equations in one variable.

The results showed that formulating a mathematical model—evidenced by errors in formulating equations, schemas or diagrams—is the main difficulty. This highlighted the importance of mathematization as a crucial process in the learning and teaching of algebra.

Locke, Sandra Kay, **(2016)** studied "The effects of the RIDE strategy on teaching word problem solving skills to students with learning disabilities"

The purpose of the present study was to evaluate the effects of the *RIDE*, a mnemonic device on solving word problems for middle school students with Learning Disabilities and to examine the teacher and student satisfaction in teaching and learning using *RIDE* to solve word problems.

Two male 8th graders participated in this study. They were both classified as having learning disabilities and were learning mathematics at a 3rd grade level. A single subject design with ABC phases was used in this study. During the baseline, the students were given a quiz with 5 word problems each day for ten days. In the intervention, these students were taught problem solving skills using the *RIDE* mnemonic. Their performance was evaluated by a weekly quiz, then assessed after one week following the intervention to examine their maintenance.

Results showed that all students increased their quiz scores when the *RIDE* mnemonic strategy was provided in math instruction. It seems that such a mnemonic strategy helps students with LD remember the process of problem solving, and increase their correct responses to quiz questions as well as their confidence in learning word problem solving skills.

Freeman-Green, O'Brien, Wood and Hitt (2015) studied 6, 8th graders with LD participated using the acronym mnemonic strategy, *SOLVE*.

The students were divided into three groups of two each. The students were instructed using *SOLVE* through 8 lessons of 30 to 45 minutes each. The process began with pretesting to ensure that the students were unaware of the strategy. After the pretest, four initial lessons were given. These involved describing the process of the strategy and modeling the five steps. Each letter of the acronym *SOLVE* was modeled independently in order to reinforce the importance of each step of the process. After the initial four lessons, the fifth lesson focused on verbal practice where student could think aloud about the process. The sixth lesson allowed the students to participate in controlled practice which was a guided practice to receive immediate feedback from the teacher. The seventh lesson focused on providing advanced practice and teacher feedback. In the eighth lesson, students were given a post-test and a satisfaction survey as well. The final lesson of the sequence was to promote generalization and maintenance of the strategy. During this lesson, students were given tests on other math topics to see if the *SOLVE* acronym could be transferred to the different concepts.

The results of this study indicated that students with LD who learned the acronyms improved accuracy of word problem solving. The strategy allows students to work through a series of steps and utilize math reasoning skills to organize their thinking and better prepare for problem solving. In addition, they were more confident in word problem solving and reported that it helped them to start and follow through the steps in the operation process.

Graham, Lisa,(2014)."Using computer-based mnemonic illustrations to teach algebra word-problem solving skills to high school students with learning disabilities"

It is clear that students with Learning Disabilities (LD) struggle with complex mathematical problems, particularly in learning algebra. Technology may provide a new way for math instruction, as well as use of a concrete instructional method such as a mnemonic device. Difficulty solving word problems in algebra can be attributed to a variety of deficits, thus it becomes difficult to choose an instructional method that will provide positive results for these students. To date, research on adolescent students in this area is limited. The present study was designed to examine the impact of a combination of two different approaches by using a mnemonic device and SMART board presentations to teach algebraic word problem solving skills to high school students with LD. It was attempted to investigate whether these approaches would improve the performance of 2 groups of secondary students with LD in learning math skills. All 6 students involved in the study improved their individual performance,-and both groups as a whole achieved 100% mastery during the last two weeks of the investigation.

Hj Mohammad HairolAzamanHjPungut and MasitahShahrill(2014) studied Students' English Language Abilities in Solving Mathematics Word Problems.

This research investigated two main areas, namely students' performance in solving mathematics word problems and the relationship between English competency and the ability to do mathematics. A total of 78, 9th students from four secondary schools participated in this study.

The findings revealed that the time or period spent in school did not determine students' ability in mathematics but rather a strong foundation in basic mathematics was a factor that contributes to a better performance in the subject. Furthermore, the English competency did not influence students' performance in doing mathematics word problems

significantly. It was proven that students need not require good English to do Mathematics word problems questions with less than 40 words (those categorised as 'Not Wordy' and 'Average Wordy' questions).

Mojeed Kolawole Akinsola and Ezekiel Olukola Odeyemi (2014) studied on the Effects of Mnemonic and Prior knowledge Instructional Strategies on Students' Achievement in Mathematics.

This study investigated the effects of Mnemonics and Prior Knowledge Instructional Strategies on Students' achievement in Mathematics. Moderating effects of Numerical Ability and Gender were also examined.

The study adopted the pretest-posttest control group, quasi experimental design with 3x2x3 factorial matrix. Two hundred and eighty-eight students from six public schools selected from three local government areas in Ibadan, Oyo State, Nigeria, participated in the study. Two instruments were developed and used: Students' Mathematics Achievement Test (r=0.75) and Numerical Ability Test (r=0.77). Also used were three operational guides on Mnemonic Instructional Strategy, Prior Knowledge Instructional Strategy and Traditional Teaching Method. Four Null hypotheses were tested at 0.5 significant levels. Data collected was analyzed using Analysis of Covariance, Multiple Classification Analysis (MCA) and Scheffe Post hoc test.

The study revealed a significant effect of treatment on students' achievement in mathematics ($F(3, 284) = 8.961$, $p<0.05$). MIS had the higher achievement score of 16.91 than PKIS 13.07 and control group 12.10. Numerical Ability and Gender have significant effect on students achievement in mathematics ($F(3,284) = 28.856$, $p<0.05$). Since, MIS and PKIS enhanced students' achievement in mathematics, therefore, teachers should create mnemonics that link old and new information in the students' memory, assess their knowledge at the start of instruction through examples that bridge students' prior knowledge with the new to ensure improved performance and make teaching and learning of mathematics students-centered.

Mohammad Seifi, Majid Haghverdi and Fatemeh Azizmohamadi (2012) Recognition of Students' Difficulties in Solving Mathematical Word Problems from the

Viewpoint of Teachers. Journal of Basic and Applied Scientific Research *Res.*, 2(3)2923-2928, 2012. *www.textroad.com*

This study attempted to detect students' difficulties in solving mathematical word problems from their teachers 'perspectives.

Participants were 52 mathematics teachers of Arak middle schools whom were chosen randomly.

The results showed that the students' difficulties were mostly sprung from their disabilities in representation and understanding of word problems, making a plan and defining the related vocabularies. The findings revealed that, the causes of the student difficulties were text difficulties, unfamiliar contexts in problems and using inappropriate strategies. Finally teachers suggested to help students in teaching them to look for a pattern, draw apicture and rewording the problems.

Mancl, Dustin B.(2011). "Investigating the effects of a combined problem-solving strategy for students with learning difficulties in mathematics"

Many students, specifically those with learning difficulties in mathematics, struggle when presented with word problems to solve. With this in mind, the purpose of this research was to examine the effects of the READER Strategy on word problem performance of students with mathematics disabilities and students who are at-risk to fail in mathematics. There were two parts to this research. Part one was implemented using a single-subject design (i.e., multiple-probe across participants) and Part two was implemented using a group design (i.e., 2 x 4 factorial design). The single-subject design included three participants identified as having mathematics disabilities. There were two males (i.e., one Hispanic fifth grader and one Black/African-American fifth grader) and one female (i.e., Hispanic fourth grader). The group design included 21 participants who were receiving Tier 2 instruction within a Response-to-Intervention program (i.e., 11 third graders in the treatment group and 10 third graders in the comparison group). Of these 21 participants 2 were Asian, 2 were Biracial, 6 were Black, 9 were Hispanic, 1 was Pacific Islander, and 1 was White. The single-subject participants and the treatment group participants received 17 mathematics researcher-developed lessons that involved the use of a combined problem-solving strategy designed to assist students with mathematical word problems. The instructional method used in these lessons combined iv the use of teacher-directed explicit instruction, a graduated word problem sequence, schema-

based diagrams, the concrete-representational-abstract sequence, and the use of a math word problem strategy (i.e., READER). The comparison group participants received 17 mathematics lessons from the standard school curricula for students receiving Tier 2 intervention within the Response-to-Intervention Program at the participating school. These lessons were designed to assist students with mathematical word problems and involved the use of teacher-directed explicit instruction, hands-on manipulative devices, student exploration, and whole group discussion and review. The Tier 2 intervention lessons presented to the comparison group were also scripted by the publisher to maintain fidelity of treatment.

The results related to Part One of the research (i.e., single-subject design) revealed that students with mathematics disabilities improved their abilities to solve mathematical word problems after receiving the combined problem solving strategy (i.e., READER). The results related to Part Two of the research (i.e., group design) revealed similar findings. Students receiving Tier 2 intervention within a Response-to-Intervention program also improved their abilities to solve mathematical word problems. Additionally, those same students were able to maintain and generalize their abilities to solve mathematical word problems two weeks after receiving the intervention

Taylor (2008) studied on the effects of a computerized-algebra program on mathematics achievement of college and university freshmen enrolled in a developmental mathematics course.

The participants included 98 college freshmen taking an intermediate algebra class. The control group consisted of 39 students enrolled in a traditional lecture, while 59 were enrolled in a web-based technology course entitled Assessment and Learning in Knowledge Spaces (ALEKS). Student achievement in both groups, using ALEKS versus traditional lecture, was measured by pre- and post- tests.

Results showed a positive relationship between the algebra pre- and post-test scores for the experiment all group, however a statistically significant difference was shown on the algebra achievement for the experimental group as well as the control group. It was shown that the control group outperformed the experimental group in some areas. This indicated that for some students lecturing would be best, while others might achieve success with

technology. Using technology provides an interactive learning environment for students with LD

Yan Ping Xin and et.al (2005) Effects of Mathematical Word Problem–Solving Instruction on Middle School Students with Learning Problems.

This study investigated the differential effects of two problem-solving instructional approaches—schema-based instruction (SBI) and general strategy instruction (GSI)—on the mathematical word problem–solving performance of 22 middle school students who had learning disabilities or were atrisk for mathematics failure. Results indicated that the SBI group significantly outperformed the GSI group on immediate and delayed posttests as well as the transfer test. Implications of the study are discussed within the context of the new IDEA amendment and access to the general education curriculum.

Test and Ellis (2005) examined the effects of teaching six students 8th grade students with LD how to solve fraction problems using this strategy.

The participants were divided into three pairs in a special education math class. LAP refers to: (a) L: look at the denominator; (b) A: ask yourself "will the smallest denominator divide into the largest denominator an even number of times; and (c) P: pick the correct fraction type. Students were taught the mnemonic device and, after mastering the strategy, students learned how to use the strategy to solve each fraction problem. Instruction continued with the same type of fraction until 89% accuracy was achieved for three consecutive days.

The results indicated a functional relationship between implementation of a mnemonic device and student acquisition of both the strategy and their ability to apply it. Five out of six students mastered both skills and maintained performance over a six week period, while the sixth demonstrated mastery of the strategy, but not the application.

Pugalee (2001). made a study on Algebra for all: The role of technology and constructivism in an algebra course for at-risk students.

In this study 16 high school students at risk of math failure were involved. Graphic calculators were used to explore relevant algebraic ideas through constructivist methods; e.g.

constructing math ideas about graphs of linear equations using hand-held graphics calculators. Qualitative data was collected by observations and anecdotal notes.

The data showed that the instructional activities enabled students to generate their own concepts based on discourse between students and teachers and their experience in the use of graphic calculators. The results showed that using technology in teaching math increased student performance.

Maccini&Ruhl, (2000) conducted a study on Effects of a graduated instructional sequence on the algebraic subtraction of integers by secondary students with learning disabilities.

Three high-school males with LD, ages14 to15, who demonstrated functional deficits in the targeted task of solving algebraic word problems participated in the study. A mnemonic device termed "STAR" was used to cue students to the steps in word-problem solution. The 'S' was for "search the problem"; 'T' for "translate the words into an equation"; 'A' for "answer the problem"; and 'R for "review the solution". A concrete, semi-concrete, and abstract instructional sequence; general problem-solving strategies; and self-monitoring strategies were provided in the instruction. Each lesson included advance organizers, modeling, guided practice, independent practice, post-test, and teacher's feedback. The experimental design was single-subject with the three subjects given four probes intermittently during baseline to determine current status and stability of the behavior under investigation to determine the need for intervention. Once stable baseline data was obtained for student one, treatment was introduced. When student one's performance increased, treatment was introduced to student two, etc. The participants were assessed after each instructional phase to determine their changes over time. Participants were observed for evidence of searching the word problem, translating the words to equations, answering the problem, and reviewing the solution. Results indicated that adolescent students with LD could learn to represent and solve word problems. All students in the study increased their percentage of strategy use, accuracy of problem representation, and accuracy of problem solution. The mnemonic device, STAR, helped students attend to critical features of word problems and make solutions.

Maccini and Hughes' (2000) studied the effects of the acronym mnemonic strategy *STAR* on learning word problem solving.

Six high school students with LD, 2 boys and 4 girls in grades ranging from 9th -12th participated to assess these students were at least two years below grade level for math and received math instruction in a resource room. Each of these students scored below an 80% on the baseline tests targeting problem solving skills.

Instruction began with the teacher introducing and modeling the use of the *STAR* strategy. Students were provided with a graphic organizer to follow the steps of the process with the teacher modeling. The *STAR* strategy was taught through a series of six steps in one lesson. First, the instructor identified the new strategy and purpose of learning. Then, the instructor described the strategy further and modeled its use. After this phase, students were provided with guided and independent practice. A post-test was then given to the students to assess their progress on using the strategy and accuracy of answers. Finally, students were provided with positive and corrective feedback from the instructor.

The results of this study indicated that *STAR* helped address a common problem of students with LD, which is applying a problem solving strategy and monitoring their own thinking. In addition, the study illustrated that once the students were able to use the steps to represent the problem, they were more successful with solving the word problem

Manalo et al. (2000) studied on the use of process mnemonics in teaching students with mathematics learning disabilities.

This study differentiated the effects of two different types of mnemonics: Fact mnemonics (FM), the more commonly known form, to remember facts, typically with one letter associated with each item; and Process mnemonics (PM) to helpremember rules, principles, and procedures. PM are especially useful for teaching subjects suchas trigonometry, math, and science, but limited studies have been found for students with LD.

This study investigated the effects of PM on the math skills of 13 and 14 year old students with LD. PM incorporates five basic principles of learning and memory: meaningfulness, organization, association, attention, and visualization. Specifically, PM is largely a verbal strategy but accompanied by visual aids such as illustrations and

demonstrations on the board, thus fostering visualization. These components assist students with LD in identifying what parts of a problem are relevant and need to be remembered vs. what are incidental.

The study involved 29, 8th graders who demonstrated math deficits. There were two control groups: Study Skills (SS) and No Instruction (NI). The SS group was instructed in reading, note-taking, and other study skills not directly related to the math skills being assessed. The NI group received no instruction at all. Each of the PM, DI, SS, and NI groups had 3-5participants. Students in the DI group received only DI instruction, while students in the PM group received PM instruction which also employed the basic DI components of demonstrating steps necessary to arrive at a correct math solution.

The most important result of this study showed that PM can be used to effectively teach computational skills to students with LD Significant differences in scores were attributable to instruction received, with gains found in the PM group. Although the PM group showed greater improvement than the DI group, the difference was not always significant. Results indicated that both PM and DI address the needs of student with LD for "learning what to do". Both also seem to address the problem of remembering and retaining steps for the short-medium term. The significant difference between the two groups was found in the long-term results. The PM group demonstrated good maintenance while the DI group showed decreased performance. Although the findings were not as strong as the previous studies, the PM seems to be the effective component in long-term retention of mathematical steps.

Walker and Poteet (1990) examined the effects of a key word strategy by comparing with a diagrammatic strategy to solve word problems.

Seventy. 6th, 7th and 8th graders with LD participated. The students were placed into one group to learn a keyword strategy or a group to learn a diagrammatic strategy to solve both one-step and two-step word problems. Before instruction began, students were given a pre-test to assess their computation skills to solve one-step and two-step word problems correctly. A total of 17, 30 minute lessons were given to each group. In the keyword group, students were taught how to locate information in a story problem, to write a number sentence and to solve the problem. In the diagrammatic group, students were also taught a strategy,

however, the strategy involved drawing a picture to represent the word problem, writing a number sentence and solving for an answer. After 17 days of instruction, students were tested.

The results revealed that neither the mnemonic nor the diagrammatic strategy increased student performance, which resulted in an inconsistent finding to the previous studies that showed effects of mnemonics on teaching students with LD word problem solving skills. Further studies may be needed to validate the findings.

Reed S. K. (1985) studied the Effect of computer graphics on improving estimates to algebra word problems.

Although this study was 20 years ago, the results gave valid insight into exploring the conditions under which computer graphics could be used to improve students' math skills. In this study, non-interactive programs with simulations were used. The participants included four groups of 30 undergraduate students with an additional 30 as a control group. Student performance was evaluated by pre- and posttests.

Results indicated that students improved estimates of average speed on 50% of the questions on the post-test but gave low estimates on 17% of the questions, for a net gain of 33% improvement. Their estimates improved but were not significant. These results indicate that computer simulations require additional modifications to make them effective, and that simply viewing a simulation of an event is not always sufficient for improving students' performance. Further, replacing verbal information with only graphic simulations was unsuccessful. Visualization allowed the students to see concrete examples of events, but depended on the students' ability to perceive and correctly interpret the relevant information. This study should be viewed as an initial step in design of a technology-based environment, and it demonstrated that non-interactive instruction is unsuccessful.

2.4.2 STUDIES IN INDIA

Thilagavathy.M and Deepa.F (2018), Star strategy for Teaching Word problems in mathematics.

Mathematics is an important subject in everyday life. Students feel Mathematics is an abstract and difficult subject, struggle even to get pass marks in the examination. Word problem skills are important to the algebraic cognition and in the aspect of mathematics competence critical for lateral school success. But students used to neglect the topics like fraction, algebra word problems. To remedy this problem STAR strategy is explored in this paper. Students feel difficult to understand word problems due to the lack of language skills, vocabulary skills and to know the content. Hence reasons for these difficulties, skills required to solve the word problems, steps of star strategy and steps to be followed by the teachers are given in brief. Three types of strategy instruction, concrete phase, semi concrete phase and abstract phase integrated with star strategy are illustrated with sample problems. Systematic application of this strategy with proper guidance of teachers help the students to solve the word problems easily and bring academic success and ensure bright future for the students.

Chapter-III
Methodology

CHAPTER – III
METHODOLOGY

CHAPTER-III

METHODOLOGY

3.1. INTRODUCTION

The aim of the present study is to find out the impact of STAR strategy in solving algebra word problems for VIII std students of Tamil Nadu state in India. To create awareness of students' algebra word problem misconception, proper intervention program should be designed for classroom practices to teach word problems using more than one instructional strategy. The students' success in algebraic word problems was then investigated.

Explicit planning is the key factor for adopting appropriate methodology in the research work to achieve successful results. Planning concern with each and every step of the research methodology related to procedure, selection of suitable method, sample, preparation and validation of instrument for collecting data, statistical techniques for analyzing data. Hence conducting a project to be valuable and fruitful, suitable methodology with specific operational steps are necessary. The research design includes the overall plan for project work; structure and the strategy of investigation to be carried out in the specific method of the research. The next important step in the research is to explain the detail of various steps followed in the research design.

This chapter consists of nine section describe the details about the variables, research design, research procedure, the method used to accomplish the study, sample, instruments which includes item analysis ,validity, reliability and threads to internal and external validity. The sections also describe the statistical analysis used for the study. In the last section conclusions are given.

3.2 METHOD OF STUDY

The major objective of the study is to find out the impact of STAR Strategy on the achievement of VIII std students in the word problems of algebra. Based on this objective, the researcher selected experimental method with parallel group design of pretest and posttest model for control group and experimental group.

3.3 RESEARCH DESIGN

The investigator used experimental method. Students who were enrolled in Government higher secondary school in Manchanviduthi during 2024 is designated as the control group and students enrolled in the same year in Government higher secondary school in Thiruvarangulam is in the experimental group .The final tools for the pretest and posttest was implemented to both groups of students. The control group was taught through the conventional method and the experimental group was taught through Strategy. The study assessed students' achievement before and after the intervention. The gain scores of students between the two groups were compared for ascertaining the influence of the treatment over the dependent variables.

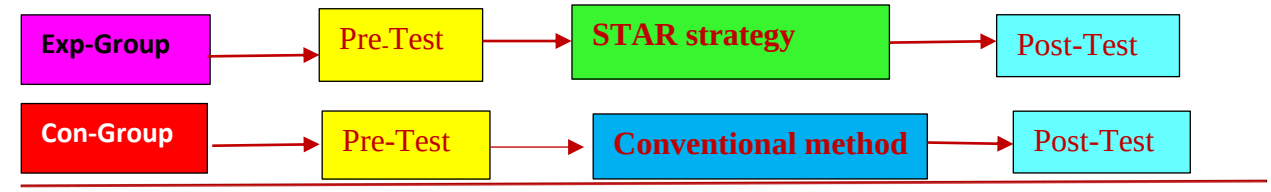


Figure-3.1.Pretest and Posttest design

The sample constituted Government higher secondary school students from Thiruvarangulam and Manchanviduthi in Pudukkottai district. Personal and school related variables were used for the study. To find out the impact of STAR strategy in solving algebra word problems in Mathematics, achievement test was constructed and validated by the researcher and used for the study. The investigator used't' test, 'F' test, as statistical techniques for data analysis.

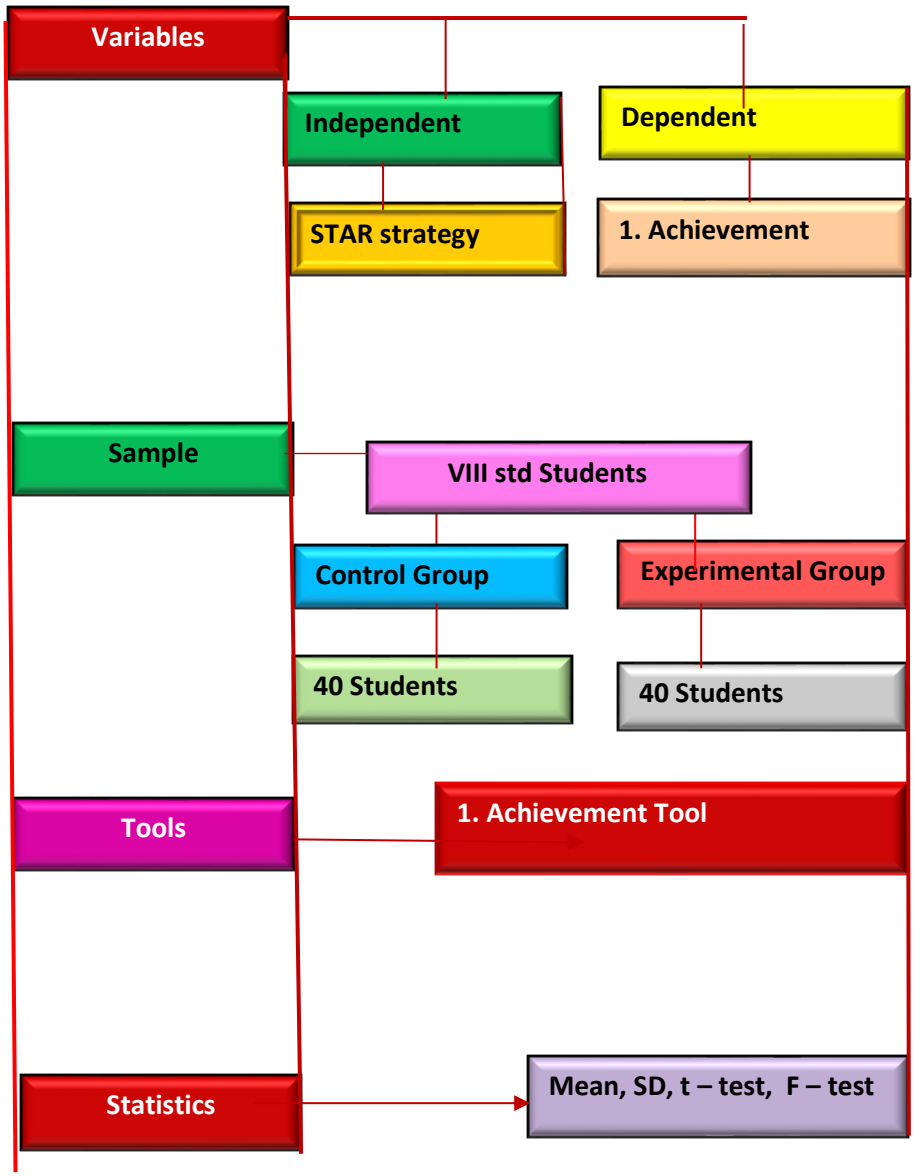


Figure-3.2. Design of the study

3.4 VARIABLES OF THE STUDY

Independent Variable

The STAR strategy is taken as an independent variable for the study.

Dependent Variables

The Achievement test istaken a dependent variables of the study.

Demographic Variables

The demographic variables are given as follows.

1. Gender –(Male / Female)
2. Birth order–(First/Middle/Last)
3. Study habit–(Group study/ Individual study)
4. Type of family**–(** Nuclear / Joint)
5. Parent's educational qualification- (up to HSS /degree and above)
6. Parent's occupation- (daily wages / Former/ self-employment)
7. Parent's annual income - (upto 100000 /above 100000)

3.5 POPULATION AND SAMPLE

Population

The Population for the present study was VIII stdstudents in Tamil Nadu state. It is time taking, costly and impossible to conduct a study for the whole population.Hence small proportion of the population made it possible to draw valuable inferences.Hence the area selected for the present study wasPudukkotaidistrict of Tamil Nadu state.

Sample

Sampling techniques refers to the process of selecting the participant of the study as a sample from the population.A sample consisting of 80 students from VIII std was selected randomly from GHSS Thiruvarangulam and Manchanviduthi in Pudukkottaidistrict in Tamil Nadu. A sample of 40 students for control group was selected from VIII std students in GHSSManchanviduthiand a sample of 40 students was selected for experimental group from VIII std students in GHSS Thiruvarangulam.

3.6. DISTRIBUTION OF SAMPLE

Table. No. 3.1

VARIABLES WISE DISTRIBUTION OF SAMPLE

S. No	Variable	Category	Experimental group	Control group
			No. of students	No. of students
1.	Gender	Male	18	14
		Female	22	26
2.	Study habit	Group study	14	17
		Self study	26	23
3.	Birth order	First	21	27
		Middle	02	04
		Last	17	09
4.	Type of family	Nuclear	32	30
		Joint	08	10
5.	Parent's educational qualification	up to HSS	34	36
		Degree and above	06	04
6.	Parent's occupation	Daily wages	31	26
		Former	03	11
		Self – employment	06	03
7.	Parent's annual income	Up to 1 Lakh	34	37
		Above 1 Lakh	6	03

3.7. RESEARCH PROCEDURE

There are two main phases in the present research, pilot study and main study.

Pilot study

Pilot study was conducted to ascertain that the instruments were effective and captured the necessary information (Anderson & Arsenault, 1998). Pilot study was conducted after getting permission from the concerned higher authorities. The investigator approached the Head master of GHSS for getting their consent to conduct pilot study and then personally met the teacher to obtain their consent.

The Research supervisors and the experts' team appraised critically the achievement test to ensure the reliability of the draft tools. They were asked to bring their inconvenience to the attention of the investigator whether any items or questions which were not clear about and any particular one that needed revision. As per the feedback of the students, some words in the items were slightly changed and four questions were removed from the achievement test. This reduced the algebra test questions to 46 items.

Administration of the Tool

The investigator approached the concerned GHSS Head master and got prior permission to conduct the pilot study. Required number of copies of the draft tool for conducting pilot study was printed, stating the purpose and assuring confidentiality, with proper instructions. The pilot study was conducted to a sample of 85 students in GHSS kottakottai and PUMS melakkottai at pudukkottai district. The investigator explained the purpose of the data collection and asked to read the instruction carefully and answer all the items.

Instructions

1. The statements that are given in the Research tool depict academic performance of students in Mathematics word problems.
2. Read the statements carefully, select any one of the option and put □√□□□□mark against each statement.
3. Give response for all the statements.
4. This tool is implemented only for research purpose

The doubts raised by the students were clarified then and there. The completed tool was collected and scoring was done as per the key of the tool.

Item Analysis:

The important steps in the standardization of any research tool is items analysis. It is a statistical technique used for items selection in a scale on the basis of the calculated values of difficulty index and discriminating power. It is done primarily to eliminate inconsistency of the items. The individual scores for the entire sample was found out.

Difficulty Index (D.I):

"Item Difficulty may be defined as the proportion of the examinees that marked the item correctly. The numerical term which indicates the level of difficulty is called Difficulty Index." (Aggarwal, 2012, p. 270). The valued answer scripts were arranged in the descending order of scores, from high to low. Two sets of scores.27% of high scores formed as upper group and 27% oflow scores formed s lower group. The number of the correct responses in both the groups were counted for each question. The Difficulty Index (D.I.) of an item is represented by the percentage of students who responded to it correctly. For each question the Difficulty Index was calculated using the following formula. In general, items should have values of difficulty not less than 20% correct and not greater than 80%.

$$\text{Difficulty Index (DI)} = \frac{\text{RU+RL}}{\text{NU+NL}} \times 100$$

Where,

RU = Number of students in the Upper Group who answered the item correctly.

RL = Number of students in the Lower Group who answered the item correctly.

NU = Number of students in the Upper Group.

NL = Number of students in the Lower Group.

Discriminative Power (D.P):

"Item Discrimination or the Discriminating Power of a test item refers to the degree to which success or failure on an item indicates possession of the ability being measured" (Aggarwal, 2012, p.272). The Discriminating Power (D.P.) of an item indicates the measure of the extent to which an item discriminate or differentiates between subjects do well on the overall test and those who do not do well on the overall test. The Discriminating Power of the item was calculated by the formula.

$$\text{Discrimination Power (D.P.)} = \frac{\text{RU}-\text{RL}}{\text{NU(or)NL}} \times 100$$

Item Selection:

Selection of items based on the value of Difficulty Index and Discrimination Power of the items. In the present investigation, only those items whose Difficulty Index (D.I.) ranged from 20% to 80% and whose Discrimination Power falls above 0.2 were selected (Aggarwal, 2012); and the rest of the items were not selected for the final study. Thus the final version of Achievement Test in mathematics had only 45 items.

Establishing Content Validity

Achievement test draft tool was given to the experts in the field of education for their evaluation. Best (1977) maintains that there is no numerical way to express the content validity, but it can be assessed by a panel of experts in the field who could judge its adequacy. The team members analyzed each item based on the objectives, the difficulty level, structural pattern of the statements, and suitability to the level of VIII std students carefully and suggested some modifications. The investigator carried out all the suggestions. The languages of the sentences were also improved with reference to construction of sentence and removal of ambiguity in the items enabling the students to understand the items without any difficulty. Thus, the content validity of the achievement test was established.

Reliability

Test-Retest method was adopted to find the reliability of the Achievement test. The tool was administered among thirty students of 85 students in GHSS kottakottai and Melakkottai after giving proper instructions. The completed tool was collected and the time taken for the test was noted. Retest was conducted to the same students after two weeks duration in the same classroom setting by the investigator. The reliability coefficient 'r' was obtained between the two sets of test scores as 0.732 at 0.01 level using Pearson's product moment correlation method. Reliability of the tool determined by the Split-Half Method using Spearman Brown Prophecy formula, which revealed that the developed tool is highly reliable.

Main study

The main study was planned to conduct step by step in different phases.

Phase-I

Identification of problems

After getting permission from the concerned higher authorities the investigator visited GHSS and identified the Problems of students in algebra word problem .The investigator discussed with teachers handling mathematic subject and understood the low achievement of students in solving word problems due to the lack of language fluency and faced difficulties in understanding the problems and writing the steps. The students also told the same thing that they use to skip of the topic while preparing for the examination. Hence the problem of solving word problem was identified.

Reviewing related studies.

Studies related to different instructional strategies applied to solve the mathematics problems, word problems and mnemonic device approach of students in mathematics were reviewed from journals, thesis, research papers, articles, projects and web sites.

Selection of Sample

The investigator selected GHSS Thiruvarangulam for experimental group and GHSS Manchanviduthi for control group in Pudukkottai district at Tamil Nadu were selected for the study.

Selection of variables

Dependent, independent and sub variables linked with academic achievement in mathematics were selected.

Selection of content

Students' performances in mathematics word problems over the years have remained poor. There are various factors cause these poor performances including class sizes, students' negative attitudes, lack of interest, students and teachers' negative concept, poor teaching learning strategies, and a lack of instructional and textual materials. Proficiency in solving algebraic word problems can also be transferred to word problems in other areas of mathematics. To assess the level of VIII std students in mathematics the topic word problems in algebra was selected as the content for the study.

Phase-II

Development of tools

Misconception of students in algebra word problems make them to experience difficulties in solving word problems. Students' general interest and attitude and achievement to the subject is poor. Hence a workshop was conducted to construct the achievement tools. One mathematics professor was acted as an expert. The investigator and two teachers in Mathematics participated in the workshop. In that workshop achievement test question paper was constructed. The constructed tools were validated by the investigator as per the guidance given by the DIET Principal, team of experts, revised and finalized for implementing to the students.

Phase III

Administration of Pre-test

The investigator conducted pre-test using achievement test on algebra word problems for both control group and experimental group students to measure the pre-level of achievement of VIII std students in algebra word problems in Mathematics.

Phase IV

Treatment to Experimental Group.

STAR strategy (includes basic activities, power point presentation, video lesson, work sheet and self-learning material) was employed to teach word problems for the experimental group in 15 days duration 35-minutes each day, during the Mathematics period by the investigator.

Treatment to Control Group

Word problems was taught for the control group students adopting conventional method in which the lecturer explained the topic, demonstrate a sample problem to the class and the students listened and taking notes for learning. It is based on face to face contact between teacher and students rely primarily on lectures and books.

Phase V

Administration of Post-test to Experimental Group

The investigator conducted posttest by administering the achievement test for the experimental group students.

Administration of Post-test to Control Group

Control group students were subjected to post-test after the completion of conventional method of teaching word problems in Mathematics. Achievement test was administered to the students.

Phase VI

Data Analysis, Interpretation and Findings

Pre-test and Post-test data for achievement test was collected, analyzed using mean, SD, ‘t’ test and ‘F’ test. Using the inferences derived from the analysis the hypotheses were

tested and findings were reported. The results showed the impact of STAR strategy in solving word problems in Mathematics.

STAR Mnemonic Device

Mnemonic is a memory device help students to remember the strategy .*STAR* is an example of mnemonic device used in the present study, empirically validated(Maccini& Hughes, 2000; Maccini & Ruhl, 2000) derived from first-letter mnemonic that can help students recall the sequential steps from familiar words used to help for solving word problems involving integer numbers. The sequential steps for STAR include: Figure 3.13).

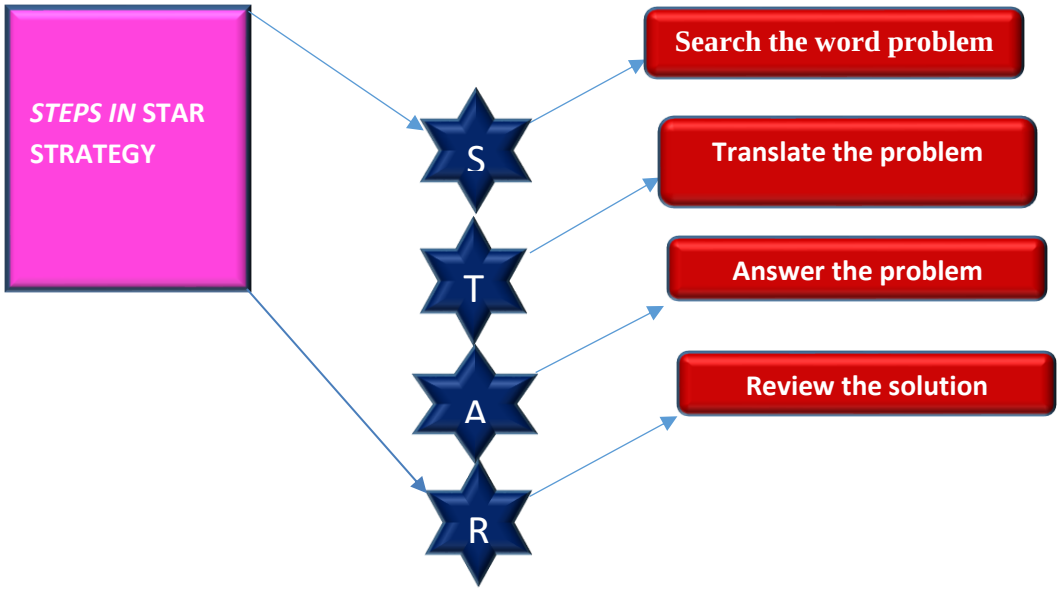


Figure 3.13-Steps for STAR Mnemonic Device

Features of Mnemonic Device

1. Familiar words stated simply and concisely help the students understand the steps easily
2. Action verbs motivate the students and create interest for the full involvement in the class (e.g., read the problem carefully)
3. Sequenced appropriately (i.e., students are cued to read the word problem carefully prior to solving the problem) and lead to the desired outcome (i.e., successfully solving a math problem)
4. Use prompts to get students to use cognitive abilities
5. Metacognitive strategies that use prompts for monitoring problem solving performance (Lenz, Ellis, & Scanlon, 1996).

3.8. INSTRUCTIONAL MATERIALS

Instructional materials refer to aids used as part of the intervention program. The steps for STAR include: teachers can use structured worksheets to help students remember and organize important steps and sub steps. Aids include concrete materials, activity sheet and student learning worksheets.

Concrete Aids

For the concrete phase of the instructional session power point presentation, manipulative (20 red and blue colored square shaped [1cm x1cm] cards and structured work sheet was used.

Semi Concrete Aids

As part of the semi concrete phase pictorial representations included pictures such as tiles, rectangles, square, triangle and sets of objects such as arrow, lines and circle were used.

Power point presentation and video software

All definitions, steps of STAR strategy, the concrete, semi concrete and abstract phases, model problems, CSA-IS sequence and steps for instructional session were presented.

Learning Sheets

Students were presented with learning sheets. Each sheet consisted of 10 problems including problems for modeling (one), guided practice (4) and independent practice (5). Problems presented in learning sheets were similar to those on the problems given in home assignment.

Activities

The sessions were conducted in groups of five. Different activities for 1.Additiion 2.Subtraction 3.Multiplication 4.Division 5.Forming algebraic polynomial using basic operation 6.Fraction 7.Sequences 8.Real life situation 9.Shapes were designed.

3.9. INSTRUCTIONAL SESSIONS

Lessons

Lessons were designed to introduce the concept of word problems during the concrete and semi concrete phases of the study and emphasized procedural knowledge in the abstract

phase. The program emphasized the relationship between manipulative, drawings and symbols. During the concrete and semi concrete phases, students worked with aids and solve problems, but were required to represent their solutions using symbols on the worksheets. The teacher encouraged the students to use the set of instruction during the concrete and semi concrete stages, although the instruction were given only during the abstract phase.

Instructional Steps for a Classroom Lesson

Advanced Organizer (model)

Each lesson began with a brief recapitulation of content previously taught and relevant to the session for that day. The instructional objectives was presented at the start of each lesson directing students‟ attention to what was required from them and what activities they would participate in. The teacher provides an advance organizer.

(a) Relate previously mastered information.

(b) State the new skill/information that is to be presented; and

(c) Provide a rationale for learning the new information.

Model Problem

In Nilgris, yesterday the room temperature in the morning was -15 ºC and the temperature in the afternoon was + 20ºC higher than the morning temperature. What was the temperature in the afternoon?

Materials required. 15 Red and 15blue cards (or tiles if available)

The first step in the STAR strategy is to search the word problem

S- *Read the problem carefully*

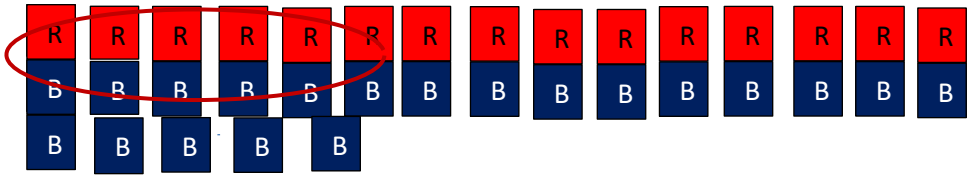
What is given in this problem? Two temperatures are given, the temperature in the afternoon is to be found out.

T*-The next step is to translate the problem into picture form.*

-15 ºC *can be represented as 15 red cards in the negative area*

and+20 ºC *blue cards can be represented 20 blue cards in the positive area.*

To find the answer the red cards and blue cards are to be paired



A –*To answer the problem, one positive and one negative cancel each other15+ve and15-ve. Therefore, the answer is +5.*

R - *Finally, answer to be checked. Reread the word problem and check the reasonableness of the answer. The answer is* + 5ºCand *it is a reasonable answer.*

Teacher

Yesterday STAR strategy involving integer number was used in solving the word problems Red cards and blue cards were used to demonstrate the problem and star work sheets to keep track of the steps.

Today, strategy of drawing pictures are used to demonstrate the problems on worksheets. This method is useful when math tiles or cards are not available to solve subtraction problems involving integer numbers. It is important to learn how to solve these problems in order to solve many real-world problems, including money and exchange problems, temperature differences, and keeping track of yardage lost or gained in a game."

Modeling

Learning sheet consisted of 10 problems (for each model) was distributed to the students. Teacher's Modeling of the strategy type and demonstrated the first problem on the learning sheets for each lesson.

"*Watch and listen while solving the problem using the* STAR *strategy in the structured worksheet".*

While modeling the use of the strategy with the target problems, the teacher checked off the steps of the structured work sheet.

Guided Practice

During guided practice opportunities were provided for the students to solve the problems using their structured worksheets. Guidance was given until the students perform the task with less support from the teacher. The teacher guided students through at least 2 problems on the learning sheet, gradually withdrawing support as students were able to solve problems independently. Vocabulary for the guided practice section of the lesson was the same as the modeling. The teacher tested the students' understanding by questioning such as

“What is the first step in solving word problems? What is given? and What is asked ?were used to elicit responses from students to find out the level of support required. Teacher asked the students to explain and give reasons for their solutions.

Independent Practice/ Progress Monitoring

At the end of each lesson, students were asked to solve the problems presented in the learning sheet with a 10-items practice problems assessing the skills targeted in the lesson. Mastery was set at 80% on practice problems. The teacher did not render any help but provided feedback once the problems were completed. Students could make use of the aids used during the lesson to solve the problems. If the student did not achieve mastery, the lesson and problems would be re-administered till mastery was attained.

Corrective Feedback

The teacher monitors student performance and provides both positive and corrective feedback during guided practice and independent practice using the following guidelines.

a) Documentation of students’ performance (correct percentage)

b) Checking for error patterns

(c) Remedial teaching if necessary and provides additional problems for students to practice corrections; and

(d) Closing the session with positive feedback.

When students were still unable to solve the problem, each lesson included explicit instructions for error correction, such as modeling the concept using concrete aids, or and modeling steps for the strategy.

Daily Home Assignment Problems

Daily Performance after the instructional session was assessed using daily home assignment problems consisted of five items developed by the investigator as per the suggestion of experts team. These problems targeted specific skills taught during the instructional lesson. The structure of the word problems consisted of three to four sentences. The first two sentences presented values that children would use to calculate. The third sentence provided the question that students had to answer, and the fourth, when used, asked students to write their answer in lowest terms.

Self-learning package

Self-learning package was prepared by the investigator as per the suggestion of team experts to enhance students' learning on algebra word problems. In each model based on the daily lesson 10 worked out problems were given. The structure of the problems was the same type which was taught during modeling session.

3.10. TOOLS USED FOR THE STUDY

1. Student's Personal data sheet for collecting necessary details related to students personal and school related variables.

2. To find out effectiveness of Integrated Strategy on the achievement of VIII std students in the word problems of algebra in Mathematics was constructed and validated with the help of experts and research guide.

3.11. ACHIEVEMENT TEST

The investigator constructed the tool as per the blueprint given in the 8 std text-book.

Table 3.10

Blue print for Achievement test

Topic	**K**	**U**	**A**	**Total**
Concrete phase	10%	10%	10%	30%
Semi concrete phase	05%	10%	15%	30%
Abstract phase	05%	05%	30%	40%
Total	20%	25%	55%	100%

Content of the test items

Word problems, Star strategy, steps in star strategy, Implementing teaching steps in class room teaching, Things to be kept in the mind while teaching Mathematical strategies, Strategy instruction for learning difficulties, Strategy instruction and its salient features,

Standardization of Achievement test

Different steps involved in the process are given below.

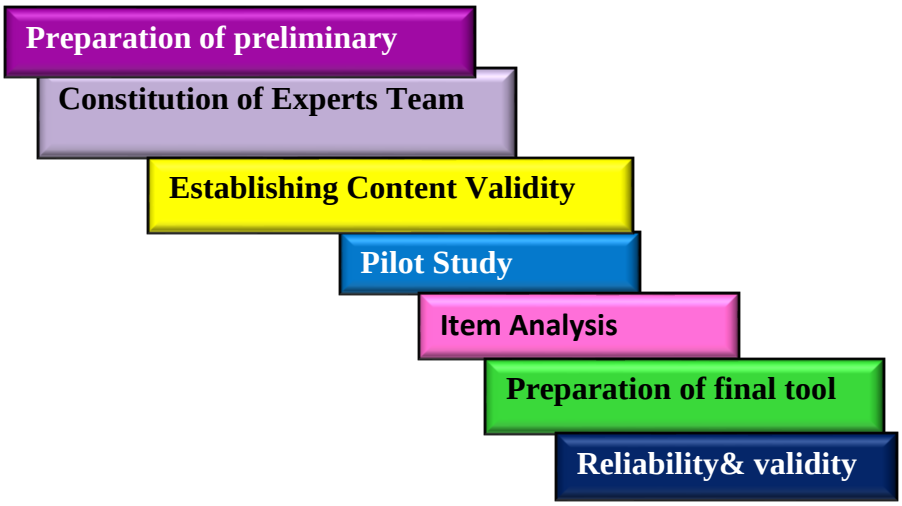


Figure-3.17 Steps in the standardization of Achievement test

Preparation of Preliminary draft

Achievement test was constructed to measure the academic performance of VIII std students in Mathematics. 65 multiple choice questions were prepared with four options (a), (b), (c) and (d), out of which only one is correct and it is given the score value of 1; the other options are incorrect. The preliminary draft was reviewed by the guide. The preliminary draft of Achievement test is given.

Constitution of Experts Team

The tool was assessed by the team of experts consisting of five members, research supervisor, and professors from Education department, teachers from schools.

3.12 DATA COLLECTION

The investigator got permission from the concerned headmaster of GHSS and visited GHSS Thiruvarangulam and Manchanviduthi for the implementation of final tools. The study was conducted among 80 students, 40 students in GHSS Thiruvarangulam selected for experimental group and 40 students in GHSS Manchanviduthi selected for control group. The investigator requested the headmaster of each GHSS to arrange a meeting after the regular class hours for the Mathematics teacher and the selected students for explaining them the detail about the purpose of visit. The investigator requested the Mathematics teacher of GHSS Manchanviduthi to teach word problems using traditional method. The researcher had a

healthy discussion with the teacher and headmaster selected for experimental group about the process of tool implementation, enquired the computer facilities, interactive white board and explained the need of their cooperation in conducting the treatment of teaching word problems using STAR strategy.

In each GHSS, after the treatment, the investigator made the students gathered in a class room with the help of teachers. The investigator also assured the students that their answers would be kept highly confidential. The investigator distributed the tools to the students and clearly instructed how to respond the tools. The investigator motivated the students to answer all the items. The students responded to the statements as per the instruction given. After the process of administering the tools the completed tools were collected and the data were collected from the sample.

3.13 STATISTICALTECHNIQUES USED FOR THE STUDY

The following statistical techniques are employed in the study

1. Mean
2. Standard Deviation
3. 't' Test
4. F test

Statistical techniques are necessary for understanding the general trends and group characteristics from a variety of individual characters (Bhandarkar, 2006).Statistics is the science of making effective use of numerical data relating to groups of individuals or experiments. It deals with all aspects of this, including not only the collection, analysis and interpretation of such data, but also the planning of the collection of data, in terms of the design of surveys and experiments.

t-test (Test of Significance)

The 't'test or test of significance of the difference between means for large independent samples (Garret, 1958) is used to compare the means between any two groups on any of the variables. If the calculated 't' value is below the table value at 5% level, the differences in mean is considered as not significant. When the calculated 't' value is above the table value at 5% level, the differences in mean is considered as significant.

ANOVA (Analysis of Variance)

ANOVA is an extremely useful technique for testing difference between the means of multiple independent samples. The basic principle for ANOVA is to test the difference among the means of samples by examining the amount of variation between the samples relative to the amount of variation between samples. The value of ANOVA is compared in the 'F' limit for given degrees of freedom at 5% level. If the 'F' value worked out is equal to exceeds out the "F' limit value from the table indicated; then there are significant difference among the samples between the means (Aggarwal, 2000).

3.14 CONCLUSION

In this chapter the methodology are explained. Methodology including sample, method, design, tool prepared by the investigator, standard tools used for the study, reliability and validity of the tool are explained. Details of STAR strategy, instruction session are explained. Data collection are given at the end of this chapter. It was envisaged that the methodology adopted and the necessary data collected to measure the impact of STAR strategy in teaching Mathematics word problems with respect to stipulated variables selected for the study i.e. academic achievement related to demographic variables would provide required data for the present research. The collected data are analyzed and interpreted in the next chapter.

Chapter-IV
Analysis and Interpretation of Data

CHAPTER – IV

ANALYSIS AND INTERPRETATION OF DATA

CHAPTER - IV

ANALYSIS AND INTERPRETATION OF DATA

4.1 INTRODUCTION

Data analysis is the process of systematically applying statistical techniques to describe, illustrate, condense, recap and evaluate data with the goal of discovering useful information, suggesting conclusions, and supporting decision-making. Statistician Tukey (1961) defined data analysis as the procedures for analysing data, techniques for interpreting the results of such procedures, gathering data to make its analysis easier, more precise or more accurate, and all the machinery and results of statistics which apply in analysing data. In other words, data analysis is a process of obtaining raw data and converting it into useful information for decision-making. According to Shamoo and Resnik (2003) various analytic procedures provide a way of drawing inductive inferences from data and distinguishing the signal (the phenomenon of interest) from the noise (statistical fluctuations) present in the data. In the view of Judd and McClelland (1989), data is collected and analyzed to answer questions, test hypotheses or disprove theories. Hence it is the process of evaluating data using analytical and logical reasoning to examine each component of the data collected. This form of analysis is just one of the many steps that must be completed when conducting a research experiment.

Data from various sources is gathered, reviewed, and then analyzed to form some sort of finding or conclusion. In the present study, data analysis is done using the statistical package SPSS version 21. For analyzing data, independent samples t-test and paired samples t-test were used. Two samples t-test is designed to test whether two population means are different, where an experiment is done with limited number of subjects (Rumsey, 2007). The paired t-test is a parametric test that allows a comparison

of means of two correlated groups. In pretest/posttest design, the data are paired where the measurements of the same variable at two different points are compared (Plichta and Garzon, 2009). In this analysis, significance value is denoted as p value and p values equal to and below 0.05 are significant at 0.05 level of significance and those equal to or below 0.01 are significant at 0.01 level of significance.

The present analysis was done to find out the impact of STAR strategy on the achievement of VIII std students in the word problems of Algebra through video lesson. The data collected were analyzed and interpreted by the investigator. For this study, the collected data were analyzed using IBM SPSS Statistics 21. The data collected was studied from different angles. The data analysis was grouped into the sections namely,

1. Pretest – Posttest Analysis
2. Posttest Analysis of experimental group

4.2 PRE-TEST ANALYSIS

A pretest is a test given to measure the outcome variable before the experimental manipulation is implemented. Pretest scores were analyzed to find out whether there is any significant difference between the control and experimental groups before the manipulation of the independent variable. This analysis also helped to check homogeneity of the groups based on the level of knowledge before treatment.

Hypothesis – 1

There is no significant difference between the Pre-test achievement mean scores of experimental group and control group in the word problems of algebra in Mathematics.

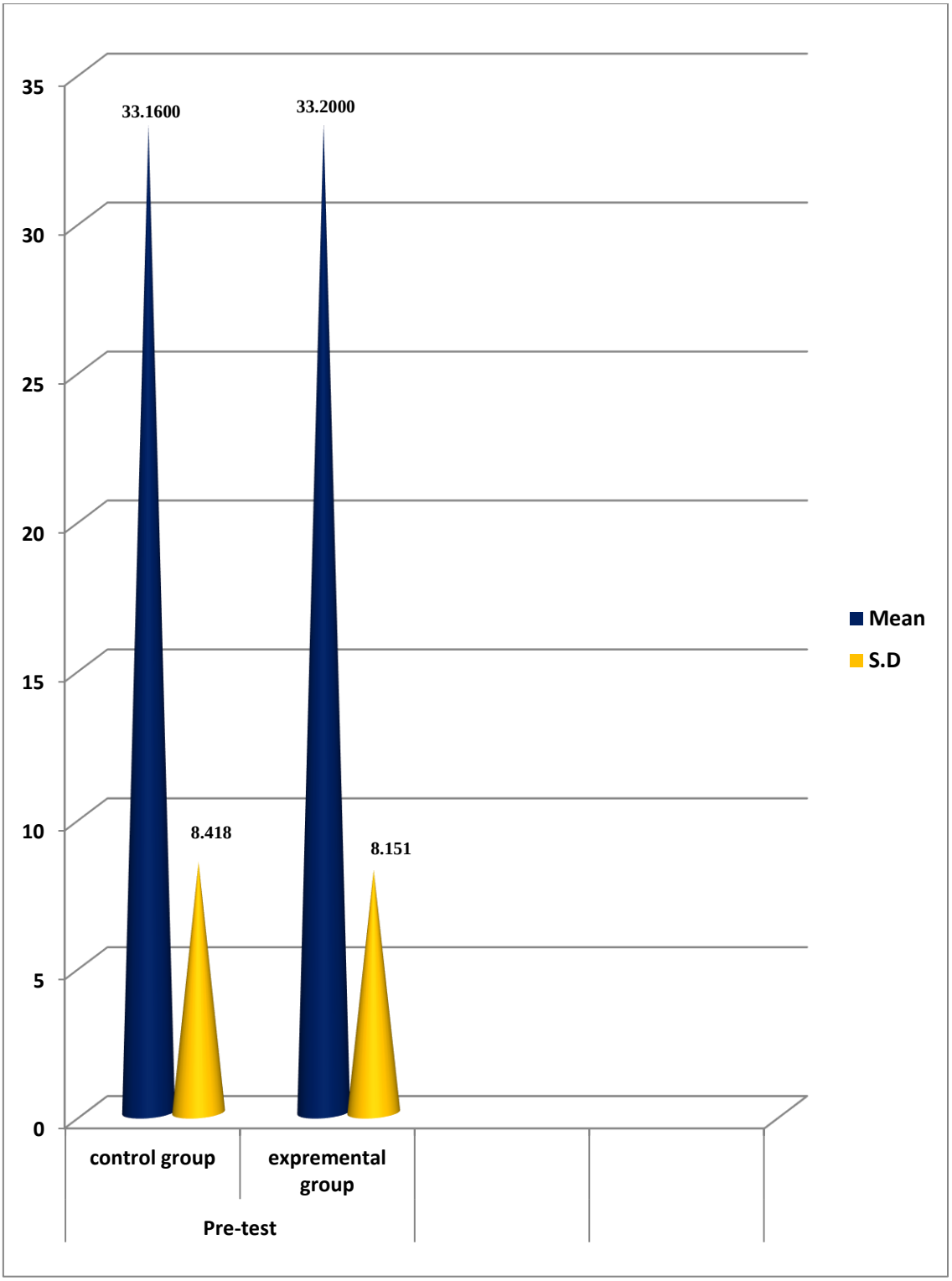
The hypothesis is tested using 't' test

Table - 4.1

Significant difference between the Pre-test achievements mean scores of experimental group and control group in the word problems of algebra in Mathematics.

Pre-test						
Group	**N**	**Mean**	**Standard Deviation**	**Df**	**'t' Value**	**Level of significance**
Control	40	33.16	8.415	78	0.0216	NS
Experimental	40	33.20	8.151			
NS – Not Significant at 0.05 level						

It is inferred from the above table that the computed 't' value (0.0216)between the experimental group and control group with respect to pre-test is lesser than the critical value of 1.990 significant at 0.05 level. Hence null hypothesis is accepted and concluded that there is no significant difference between the pre-test achievement mean scores of the experimental group and the control group in mathematics.



Graph - 4.1

Graph showing the difference between the Pre-test achievements mean scores of experimental group and control group in the word problems of algebra in Mathematics.

4.3 POST-TEST ANALYSIS

Posttest is an achievement test given to students after completion of the instructional programme. It is a test given to measure the outcome variable after the experimental manipulation is implemented. A posttest is preceded by a pretest prior to the experimental manipulation, which is the same test as the posttest. This pretest-posttest design allows the experimenter to test whether there is any effect the experimental manipulation had by assessing the differences between the pretest and posttest. If there is any difference, it is likely to be due to the manipulation. Posttest analysis is carried out to know whether there is any significant difference between the posttest scores of control and experimental groups.

Hypothesis – 2

There is no significant difference between the Post-test achievement mean scores of experimental group and control group in the word problems of algebra in Mathematics.

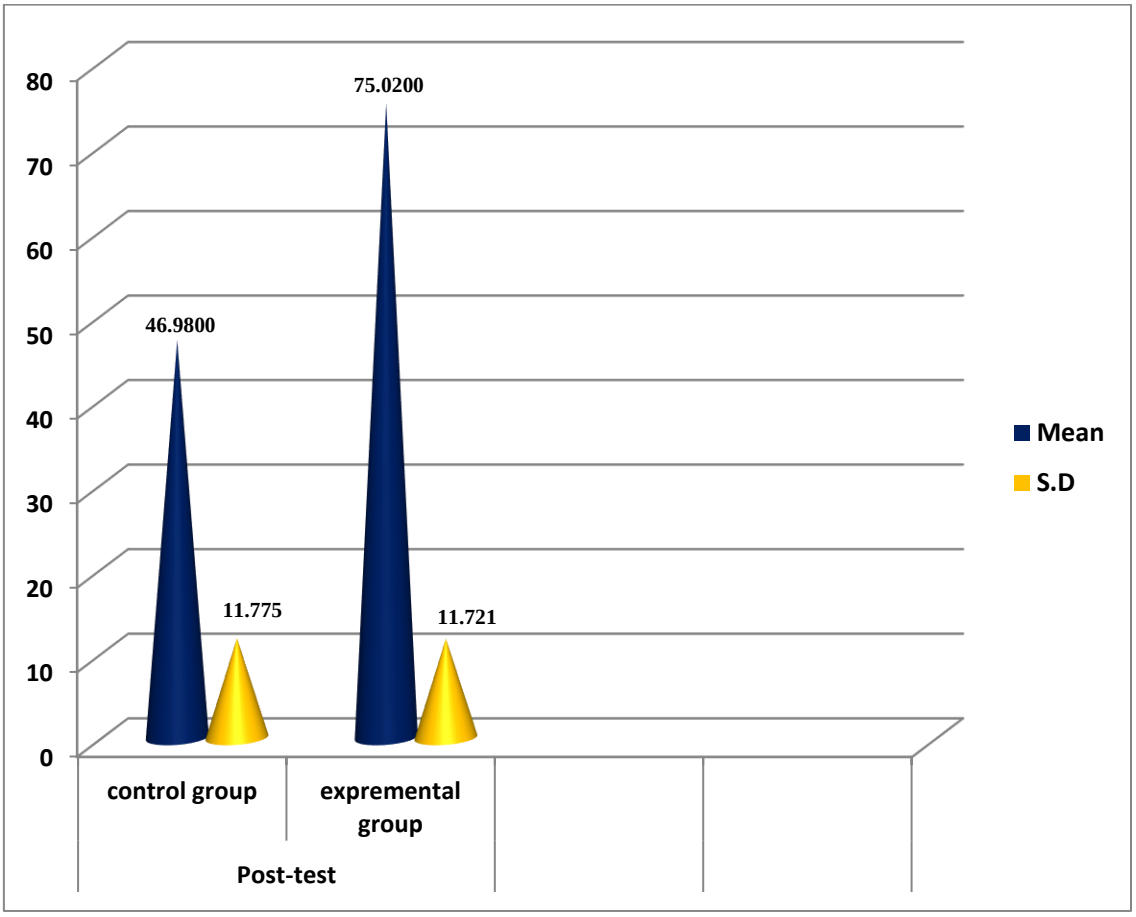
The hypothesis is tested using 't' test

Table - 4.2

Significant difference between the Post-test achievement mean scores of experimental group and control group in the word problems of algebra in Mathematics.

Post-test						
Group	**N**	**Mean**	**Standard Deviation**	**df**	**'t' Value**	**Level of significance**
Control	40	46.98	11.775	78	10.8740	*S
Experimental	40	75.02	11.721			

It is also inferred from the above table that computed 't' value (10.8740) between the experimental group and control group with respect to post-test is greater than the critical value of 1.990 significant at 0.05 level . Hence null hypothesis is rejected and concluded that there is a significant difference between the post-test achievements mean scores of experimental group and control group in mathematics. It is also inferred that the impact of STAR strategy on achievement in mathematics is higher compared to traditional method.



Graph - 4.2

Graph showing the difference between the Pre-test achievements mean scores of experimental group and control group in the word problems of algebra in Mathematics.

Hypothesis – 3

There is no significant difference between the Pre-test and Post-test achievement mean scores of control group in the word problems of algebra in Mathematics.

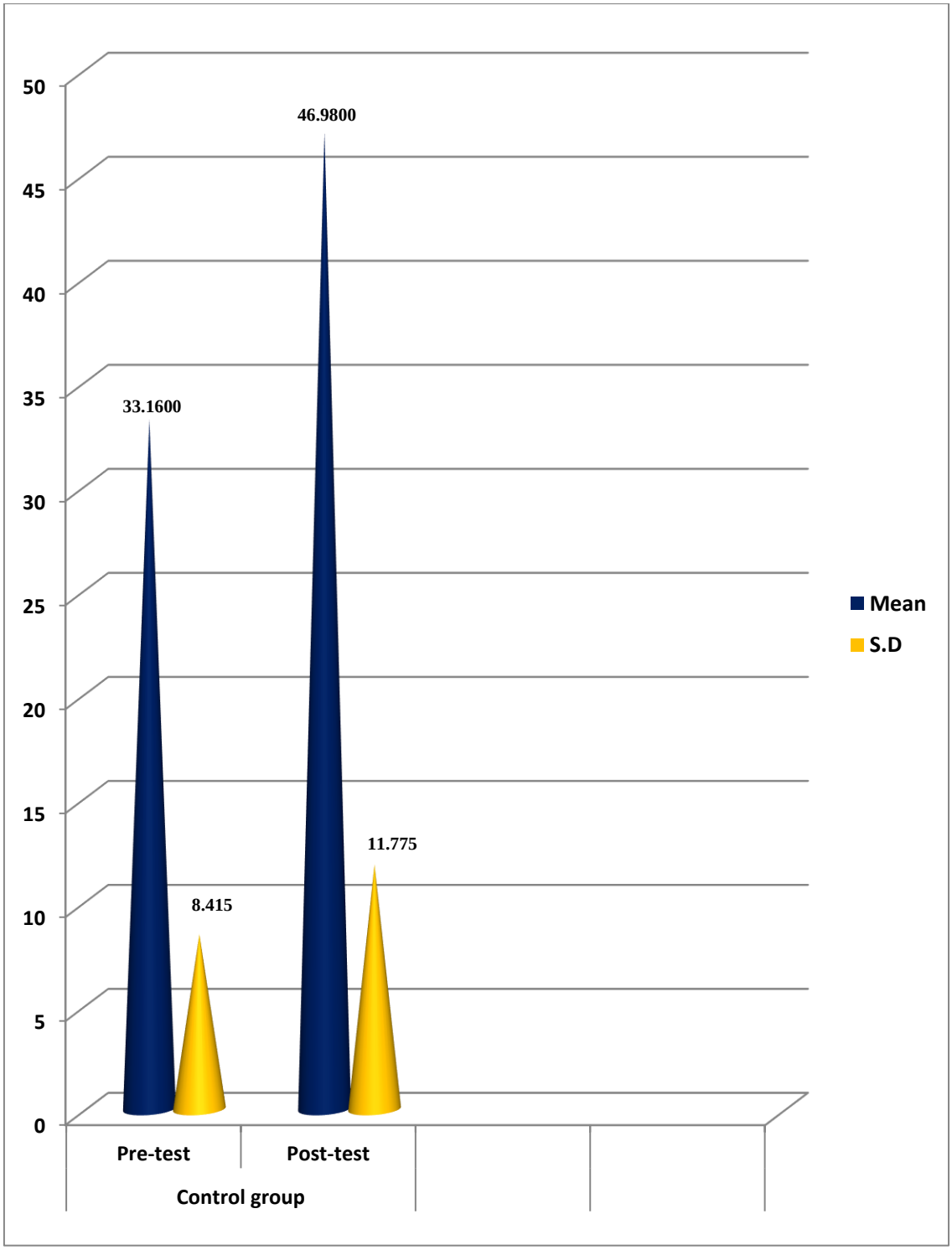
The Hypothesis is tested using 't' test

Table - 4.3

Significant difference between the Pre-test and Post-test achievement mean scores of control group in the word problems of algebra in Mathematics.

Control group						
Type of test	**N**	**Mean**	**Standard Deviation**	**df**	**'t' Value**	**Level of significance**
Pre-test	40	33.16	8.415	78	6.1033	S
Post-test	40	46.98	11.775			
S – Significant at 0.05 level , critical value 1.990						

From the above table, it is clear that the computed 't' value is 6.1033, which is significant at 0.05 level. Therefore the null hypothesis is rejected. Hence it can be said that there exist significant difference between the pretest and posttest mean scores of the control group with regard to achievement in mathematics. The mean scores show that the posttest scores of the control group are better than the pretest in their achievement in mathematics.



Graph - 4.3

Graph showing the difference between the Pre-test and Post-test achievements mean scores of the control group in the word problems of algebra in Mathematics.

Hypothesis – 4

There is no significant difference between the Pre-test and Post-test achievement mean scores of experimental group in the word problems of algebra in Mathematics.

The hypothesis is tested using 't' test.

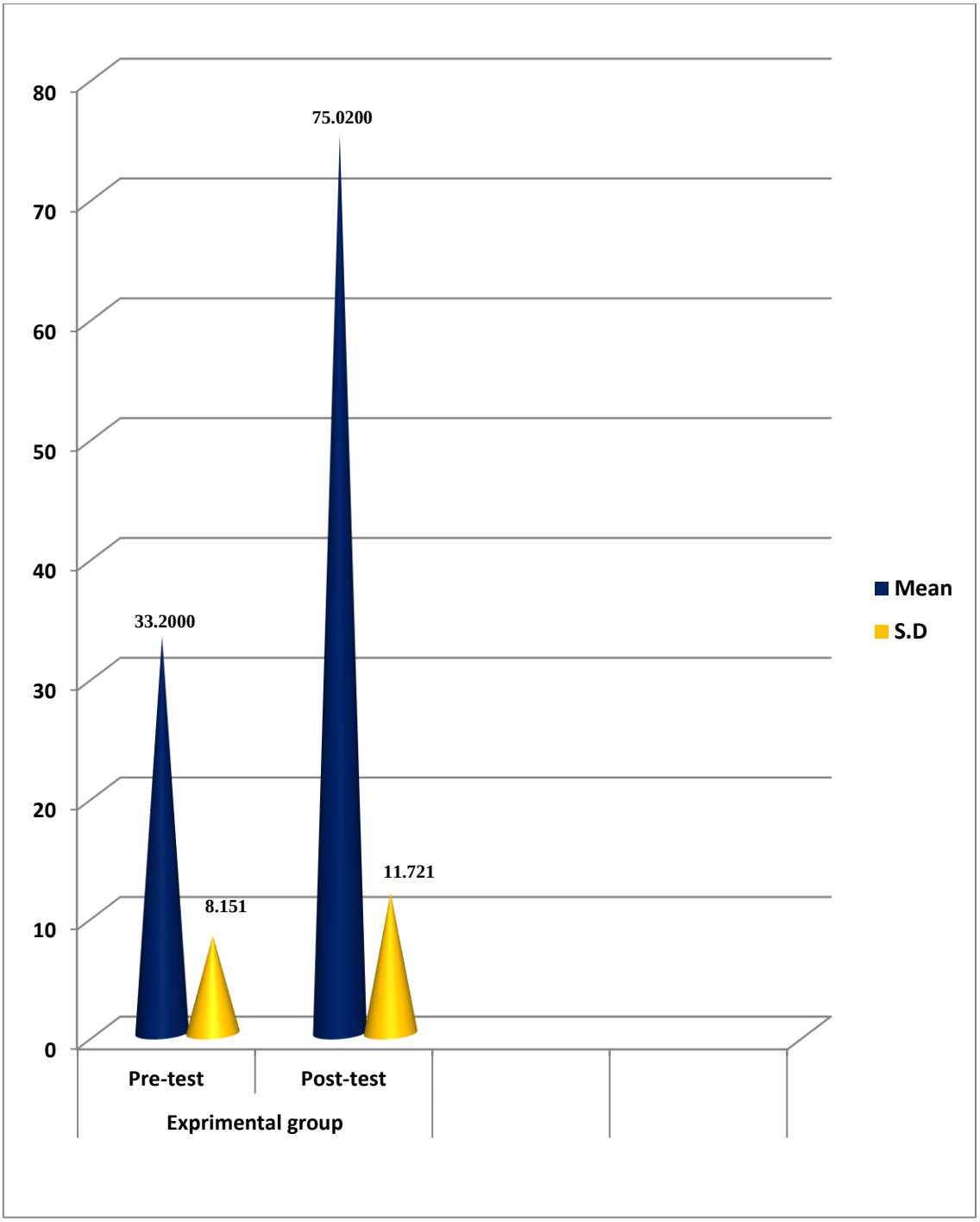
Table - 4.4

Significant difference between the Pre-test and Post-test achievement mean scores of the experimental group in the word problems of algebra in Mathematics.

Experimental group						
Type of test	**N**	**Mean**	**Standard Deviation**	**df**	**'t' Value**	**Level of significance**
Pre-test	40	33.20	8.151	78	18.5264	S
Post-test	40	75.02	11.721			
S – Significant at 0.05 level, critical value 1.990						

From table 4.4, it is clear that the computed 't' value is 18.5264, which is significant at 0.05 level. Therefore the null hypothesis is rejected. Hence it can be said that there exist significant difference between the pretest and posttest mean scores of the experimental group with regard to achievement in mathematics. The mean scores show that the posttest scores of the experimental group are better than the pretest in their achievement in mathematics.

It is also inferred that the impact of STAR strategy on achievement in mathematics is higher compared to traditional method.



Graph - 4.4

Graph showing the difference between the Pre-test and Post-test achievements mean scores of the experimental group in the word problems of algebra in Mathematics.

Hypothesis – 5

There is no significant difference between the Post-test achievement mean scores of the experimental group in the word problems of algebra in Mathematics with respect to gender.

The hypothesis is tested using 't' test

Table 4.5

Significant difference between the Post-test achievement mean scores of the experimental group in the word problems of algebra in Mathematics with respect to gender.

Gender	**N**	**Mean**	**Standard Deviation**	**df**	**'t' Value**	**Level of significance**
Male	18	74.00	11.328	38	0.4585	*NS
Female	22	76.04	15.837			
Critical value at 0.05 level = 2.021						

The above table shows that the computed value of 't' (0.4585) is less than the critical value of 2.021 at 0.05 level of significance. Hence null hypothesis is accepted and concluded that there is no significant difference between the post-test achievement mean scores of experimental group in Mathematics with respect to gender.

Hypothesis – 6

There is no significant difference between the Post-test achievement mean scores of the experimental group in the word problems of algebra in Mathematics with respect to study habit.

The hypothesis is tested using 't' test.

Table 4.6

Significant difference between the Post-test achievement mean scores of the experimental group in the word problems of algebra in Mathematics with respect to study habit.

Study habit	**N**	**Mean**	**Standard Deviation**	**df**	**'t' Value**	**Level of significance**
Self-study	26	76.16	12.438	38	0.5768	*NS
Group study	14	73.88	11.642			
Critical value at 0.05 level = 2.021						

The above table shows that the computed value of 't' (0.5768) is less than the critical value of 2.021 at 0.05 level of significance. Hence null hypothesis is accepted and concluded that there is no significant difference between the post-test achievement mean scores of experimental group in the world problem of algebra in Mathematics with respect to study habit.

Hypothesis – 7

There is no significant difference between the Post-test achievement mean scores of the experimental group in the word problems of algebra in Mathematics with respect to birth order.

The hypothesis is tested using 't' test.

Table 4.7

Significant difference between the Post-test achievement mean scores of the experimental group in the word problems of algebra in Mathematics with respect to birth order.

Source of Variation	Sum of Squares	df	Mean Variance of Squares	'F' Value	Level of significance
Between groups	30.040	2	15.020	0.426	NS
Within groups	1481.204	37	35.267		
NS – Not Significant. Degrees of freedom = (2,37), Critical value at 0.05 level = 3.23					

The above table shows that the computed value of 'F' (0.426) is less than the critical value of 3.32 at 0.05 level of significance. Hence null hypothesis is accepted and concluded that there is no significant difference between the post-test achievement mean scores of experimental group in the world problem of algebra in Mathematics with respect to birth order.

Hypothesis – 8

There is no significant difference between the Post-test achievement mean scores of the experimental group in the word problems of algebra in Mathematics with respect to type of family.

The hypothesis is tested using 't' test.

Table 4.8

Significant difference between the Post-test achievement mean scores of the experimental group in the word problems of algebra in Mathematics with respect to type of family.

Type of family	N	Mean	Standard Deviation	df	't' Value	Level of significance
Joint family	08	75.24	14.24	38	0.0766	*NS
Nuclear family	32	74.80	13.634			
Critical value at 0.05 level = 2.021						

The above table shows that the computed value of 't' (0.0766) is less than the critical value of 2.021 at 0.05 level of significance. Hence null hypothesis is accepted and concluded that there is no significant difference between the post-test achievement mean scores of experimental group in the world problem of algebra in Mathematics with respect to type of family.

Hypothesis – 9

There is no significant difference between the Post-test achievement mean scores of the experimental group in the word problems of algebra in Mathematics with respect to parent's educational qualification.

The hypothesis is tested using 't' test.

Table 4.9

Significant difference between the Post-test achievement mean scores of the experimental group in the word problems of algebra in Mathematics with respect to parent's educational qualification.

parent's educational qualification.	**N**	**Mean**	**Standard Deviation**	**df**	**'t' Value**	**Level of significance**
Up to HSS	34	74.62	13.0634	38	0.1441	*NS
Degree and above	06	75.42	12.4462			
Critical value at 0.05 level = 2.021						

The above table shows that the computed value of 't' (0.1441) is less than the critical value of 2.021 at 0.05 level of significance. Hence null hypothesis is accepted and concluded that there is no significant difference between the post-test achievement mean scores of experimental group in the world problem of algebra in Mathematics with respect to parent's educational qualification.

Hypothesis – 10

There is no significant difference between the Post-test achievement mean scores of the experimental group in the word problems of algebra in Mathematics with respect to parent's occupation.

The hypothesis is tested using 't' test.

Table 4.10

Significant difference between the Post-test achievement mean scores of the experimental group in the word problems of algebra in Mathematics with respect to parent's occupation.

Source of Variation	Sum of Squares	df	Mean Variance of Squares	'F' Value	Level of significance
Between groups	32.436	2	14.624	0.7420	NS
Within groups	1492.764	37	36.532		
NS – Not Significant. Degrees of freedom = (2,37), Critical value at 0.05 level = 3.23					

The above table shows that the computed value of 'F' (0.7420) is less than the critical value of 3.32 at 0.05 level of significance. Hence null hypothesis is accepted and concluded that there is no significant difference between the post-test achievement mean scores of experimental group in the world problem of algebra in Mathematics with respect to parent's occupation.

Hypothesis – 11

There is no significant difference between the Post-test achievement mean scores of the experimental group in the word problems of algebra in Mathematics with respect to parent's annual income.

The hypothesis is tested using 't' test.

Table 4.11

Significant difference between the Post-test achievement mean scores of the experimental group in the word problems of algebra in Mathematics with respect to parent's annual income.

parent's annual income.	**N**	**Mean**	**Standard Deviation**	**df**	**'t' Value**	**Level of significance**
Up to 1 Lakh	34	73.24	12.2436	38	0.5695	*NS
Above 1 Lakh	06	76.80	14.4214			
Critical value at 0.05 level = 2.021						

The above table shows that the computed value of 't' (0.5695) is less than the critical value of 2.021 at 0.05 level of significance. Hence null hypothesis is accepted and concluded that there is no significant difference between the post-test achievement mean scores of experimental group in the world problem of algebra in Mathematics with respect to parent's annual income.

4.4 CONCLUSION

The investigator analyzed the data statistically using Descriptive and Differential analysis as statistical technique, interpreted the data and presented in this chapter. The hypotheses related to achievement was tested and presented in sequential order. The next chapter deals with important findings, interpretation, discussion, suggestions, recommendations and conclusion.

Chapter-V
Summary of Findings and Conclusion

CHAPTER – V

SUMMARY OF FINDINGS AND CONCLUSION

CHAPTER-V

FINDINGS, INTERPRETATION, DISCUSSION AND CONCLUSION

5.1. INTRODUCTION

This study was conducted for the purpose of establishing the impact of STAR strategy on the achievement of VIII std students in the word problems of algebra in mathematics. The study was an equivalent control group pretest-posttest experimental design. It was conducted in the two selected schools. Fourty students for experiment group were selected from Government higher secondary school Thiruvarangulam in Pudukkottai district and a sample of 40 students were selected for control group from Government higher secondary school Manjanviduthi in Pudukkottai District, Tamil Nadu. The experimental group was taught the word problems using the STAR strategy and the control group was taught using the traditional method. Data was collected using pre-test and post-test achievement test question. The data was analyzed to determine the impact of STAR strategy which influence on students' achievement in Mathematics. The data collected were analyzed in order to test the hypothesis formulated for this study using statistical techniques. Based on the data analysis and hypothesis testing, the following findings were found out and interpreted. The investigator reported the findings, interpretations, implications, recommendations and suggestions in this chapter.

5.2. FINDINGS OF THE STUDY

Pre-test Analysis

1. There was no significant difference ("t" value 0.0216) between the Pre-test achievement mean scores of experimental group and control group in the word problems of algebra in Mathematics.

Pre-test and Post-test Analysis

2. There was a significant difference ("t" value 6.1033) between the Pre-test and Post-test achievement mean scores of control group in the word problems of algebra in Mathematics.
3. There was a significant difference ("t" value 18.5264) between the Pre-test and Post-test achievement mean scores of experimental group in the word problems of algebra in Mathematics.

Post-test Analysis of Experimental group and Control group

1. There was a significant difference ("t" value 10.8740) between the post-test achievements mean scores of experimental group and control group in the word problem of algebra in mathematics. It is also inferred that the impact of STAR strategy on achievement in mathematics is higher compared to traditional method.

Post-test Analysis of Experimental group

1. There is no significant difference between the Post-test achievement mean scores of the experimental group in the word problems of algebra in Mathematics with respect to gender.
2. There is no significant difference between the Post-test achievement mean scores of the experimental group in the word problems of algebra in Mathematics with respect to birth order.
3. There is no significant difference between the Post-test achievement mean scores of the experimental group in the word problems of algebra in Mathematics with respect to study habit.
4. There is no significant difference between the Post-test achievement mean scores of the experimental group in the word problems of algebra in Mathematics with respect to type of family.
5. There is no significant difference between the Post-test achievement mean scores of the experimental group in the word problems of algebra in Mathematics with respect to parent's educational qualification.
6. There is no significant difference between the Post-test achievement mean scores of the experimental group in the word problems of algebra in Mathematics with respect to parent's occupation.
7. There is no significant difference between the Post-test achievement mean scores of the experimental group in the word problems of algebra in Mathematics with respect to parent's annual income.

5.3 INTERPRETATION

1. The 't' test result revealed that students in control group and experimental group differed in their achievement scores at post-test level. Experimental group exhibited better performance in post-test than the control group. This may be due to the fact that the use of mnemonic strategy (STAR strategy), it was more likely that the students

would be able to remember factual information, answered questions, and learned word problems easily. Also, Fontana, Scruggs and Masropieri, (2007), reported that when asked about their preferences for instructional strategies, the majority of students preferred mnemonics instruction; they felt they learn more, and would prefer to use mnemonic instruction in other content areas.

2. There was a significant difference between the pre-test and post-test scores of experimental group students' achievement in the word problem of algebra in mathematics. Experimental group exhibited better performance in post-test compare than the pre-test. This may be due to the fact that the use of STAR strategy.

5.4. DISCUSSION OF RESULTS

The purpose of the present study was to evaluate the impact of STAR a mnemonic device on solving word problems for VIII std students with LD and to examine the student satisfaction in learning word problems. The present investigation examined the effects of STAR strategy C-S-A instruction using STAR mnemonic device for solving word problems. Results of pre- post-test analyses showed that there was a statistically significant difference in t test between the experimental group and the control group on word problems in Algebra.

Research has shown the benefits of STAR strategy for teaching VIII std students how to become effective problem-solvers in word problems, C-S-A instruction clearly teaches students how to analyze the problem and then helps them to understand the links between information in the word problem and different types of C-S-A instruction in STAR mnemonic device .

Impact of STAR strategy on achievement in Mathematics

Results of the study showed that there is a significant difference between the post-test mean scores of the achievement in Mathematics of the experimental group and the control group. The present study found that the effectiveness of integrated strategy on the achievement in Mathematics was higher compared to traditional method. The following studies used of different mnemonic strategies.

The following studies used different mnemonic strategies just like the present study used for STAR mnemonic strategy to enhance the achievement of students in Mathematics algebra word problems and supported the findings of the present study.

Maccini and Hughes' (2000) studied the "Effects of the acronym mnemonic strategy *STAR* on learning word problem solving and the results indicated that *STAR* helped to address a common problem of students, which is applying a problem solving strategy and monitoring their own thinking.

In the studies conducted by **Maccini&Ruhl (2000)** the results demonstrated that the mnemonic device, STAR, helped students to attend a critical features of word problems and make a solutions. **Manalo et al. (2000)** demonstrated that using mnemonics seemed to increase the Performance of students in choosing the correct procedures when solving algebraic equations and to retain those steps over time. The results of **Pugalee (2001)** showed that using technology in teaching of Mathematics increased students performance.

Monica (2001) and Vaidyanathan (2001) used multimedia instructional strategy and their findings showed that the multimedia group had higher score than the traditional group. **Owen and Fuchs (2002)** examined the effects of strategy instruction and found that students who received the instructional strategy did significantly better on the post-assessment of students in the control group. The study of **Xin, Jitendra, and Deatline-Buchman (2005)** indicated that students who participated in the schema-based instruction performed significantly better than students who participated in the general strategy instruction. **Meera Raj (2007)** experimented on the Effectiveness of Advance Organizer Model (AOM) and found that the mean scores obtained for the experimental group was more than that of the control group. **Hsieh and Lin (2008)** studied on Dynamic visual computer design for factors and multiples word problem learning and the results showed that students had significant improvement in successful decoding of textual information, so that they were able to choose correct formulas and symbols. **Lopez, Lurdes, (2008)** studied on helping at-risk students to solve Mathematical Word Problems through the use of Direct Instruction and Problem Solving Strategies and the results showed that effectiveness on use of direct instruction and problem-solving strategies on at-risk students.

Research by **Jiminez et al. (2008)** indicated that manipulative and mnemonics helped to increase the student knowledge of step by-step procedures. **Thiyagu, K. (2006) and Soosai Raj (2008)** studied on the Effectiveness of web-based classroom instruction and found that there was a significant difference between pre-test and post-test of control group and experimental group. The results of **Mancl, Dustin B. (2011)** showed that students with mathematics disabilities improved their abilities to solve mathematical word problems after receiving the combined problem solving strategy (i.e., READER).

Ramesha and Narayanamoorthy, M. (2012) explored the effect of tutorial teaching strategy and showed that there was a significant difference between the achievement of control group and experimental group. **O'Brien, Wood and Hitt's study (2015)** showed that using an acronym mnemonic strategy resulted in higher percentages of correct answers. When comparing these results, used explicit instructions strategy similarities can be noted. Results indicated that teaching students through instruction could enhance the achievement of students in Mathematics. The study of **Ram Mehar and Radhika Visalam Krishnamoorthy (2019)** indicated that problem solving strategies group was founded significantly higher than that of conventional teaching group. **Martin and Fuchs (2019)** investigated the effects of a mathematics intervention teaching schemas to problem-solving and found that students who received the intervention showed substantial gains on a mathematics outcome measure.

The findings of the following studies differed from the findings of the present study regarding strategy.

Walker and Poteet (1990) examined the effects of a key word strategy and found that neither the mnemonic nor the diagrammatic strategy increased the student performance.

Thillaka and Pramilla (2000) studied on the use of computer multimedia programme in learning trigonometry among high school students and the findings showed that there was no influence of computer-based multimedia programme on the achievement in Mathematics among high school students.

The results of **Senthamarai Kannan, B. (2016)** showed that the level of problem solving ability of IX standard students in mathematics was average.

5.5. EDUCATIONAL IMPLICATIONS

Several practical implications emerged from this study.

1. STAR is a mnemonic device that shows great promise in helping students with LD to improve their word problem solving skills, increase achievement scores, and develop interest in solving word problems.
2. The results of the current study provide implications for further research. Future studies should consider simplifying the mnemonic strategy for students with LD.
3. A simplified mnemonic could possibly help the students to remember the steps and to retain the information for a longer period of time.
4. Teachers using the STAR strategy should allow more time for lessons that involve the use of devices.
5. While teaching students who struggle with mathematics word problems, it may be important to supplement core curricula with specialized strategies.
6. The use of explicit teaching that includes video lesson, PowerPoint presentation, teacher demonstrations using activities, guided practice, independent practice, and self-learning served the participants well in this study.
7. Even though word problems are especially difficult for many students, there were no serious behavioral issues during the implementation of the lessons content.

5.6 RECOMMENDATIONS OF THE STUDY

1. Based upon the results of this study, several recommendations can be made to further study. The regional scope of the study should be expanded so that it is not limited to one classroom of students or one school in a district.
2. More research could also be conducted to examine if students with LD continue to use the of C-S-A instruction using STAR mnemonic device over a longer period of time.
3. It also appears that some students, especially those with mathematics disabilities would benefit from reviews and additional practice to maintain newly learned skills.
4. The students seemed to enjoy the structure and predictability of using this process during the word problem lessons. Additionally, this lesson sequence seemed to set the students up for success due to extensive teacher support at the beginning of each lesson that was gradually withdrawn as the lesson progressed.

5. The curriculum designers and the teachers should articulate well on the usefulness and applicability of mathematics in general so that students create positive minds towards the subject and subsequently strive to improve in the subject.
6. The Ministry of education, teachers and parents should ensure that performance of mathematics among students is improved so as to dislodge the negative attitude and create a positive one on performance of mathematics in secondary schools.
7. The parents and the teachers should explore other avenues to change the behavior of students towards mathematics and the interests of the students towards the subject.
8. The learners should be able to understand the need for a commitment to be fully engaged and to be willing to embrace logic behind every success in mathematics so as to acquire the necessary knowledge and skills for examinations.
9. Teachers can best motivate their learners to excel in mathematics as they are changing and shaping the learners attitude towards the subject.
10. Mathematics departmental counseling should be undertaken regularly to assist students with persistent negative attitudes towards learning and performance in mathematics.
11. Mathematics teachers should wisely utilize available learning resources to enhance positive attitudes, reinforce neutral attitudes, if any, and neutralize any negative attitudes towards learning and performance of mathematics.

5.7. SUGGESTIONS FOR FURTHER RESEARCH

1. The study suggests that an extensive similar study be done in all Government higher secondary school with in Tamil Nadu , so as to have a comprehensive report on influence of students' attitudes on mathematics performance of students.
2. The study was done with only limited to students. However, the views of the teachers were left out. There is a need to carry out a similar study involving the teachers in order to incorporate their views so as to have a comprehensive report.
3. Research should be conducted to investigate the effects of STAR strategy when teaching word problems that require the use of multiplication and division.
4. Research should be conducted to investigate the effects of the current study on different populations (i.e., students with Intellectual Disabilities, Emotional Disturbance, students from advantaged families, or students with gifts and talents).

5. The required number of lessons may need to be changed based on ability or disability. Additionally, the outcomes may be different when teaching the strategy to a more diverse population.
6. Research should be conducted to investigate the effects of STAR strategy with different grade levels (i.e., students in middle school or high school).
7. The number of lessons at each level (i.e., Abstract, semi concrete or Concrete) may require some adjustments based on the maturity and skill level of students in different grades.
8. Research should be conducted to investigate the impact of STAR strategy on different instructional levels of word problems in Algebra.
9. Research should be conducted to investigate participant abilities to generalize the STAR strategy into core curriculum (i.e., during mathematics instruction in the general education classroom). The outcomes may be different when comparing multiple settings and teachers.

5.8. CONCLUSION

This current investigation explored whether integrated strategies make students to solve word problems, would enhance the skill of solving word problems of struggling students. According to Difficulties with word problems and problem-solving skills have been well documented in both special education and general education students. More research is needed to identify effective ways and strategies to teach students to solve word problems. More research is needed on STAR strategy instruction versus general strategy instruction and ways in which teachers can begin to implement instruction into their class rooms. The findings of this study have shown that STAR strategies were more effective in improving the students' achievement in Mathematics.

The results revealed that Mnemonic Instruction using STAR strategy had the higher mean score than the control group students taught by the conventional teaching method. The reason is that STAR strategy enables students to remember factual information, provide a visual or verbal prompt for students who may have difficulty retaining information. Based on the findings of the study, it has been recommended that teachers should facilitate the use of STAR strategies to teach word problems for enhancing positive attitude of students towards Mathematics develop interest and improve their achievement in Mathematics. They should also include varieties of Mnemonics into their instructional strategies to effectively cater for the diverse abilities of students within their classrooms.

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Appendices

APPENDIX-I

STUDENTS' PERSONAL DATA SHEET

DISTRICT INSTITUTE OF EDUCATION AND TRAINING PUDUKTTAI.

Investigator
Dr. S. Muthukaruppan
Lecturer
District Institute of Education and Training
Pudukkottai 622004.

Dear students

I request you to provide your responses for the tool administered to you for my Project work. I assure you that the information given here will be kept strictly confidential and will be used for the project work.

Thank you

Your's Sincerely,

Name of the student :

Name of the school :

Class :

1. Gender –(Male / Female)
2. Birth order–(First/Middle/Last)
3. Study habit–(Group study/ Individual study)
4. Type of family**–(** Nuclear / Joint)
5. Parent's educational qualification- (up to HSS /degree and above)
6. Parent's occupation- (daily wages / Former/ self-employment)
7. Parent's annual income - (upto 100000 /above 100000)

APPENDIX-II
ACHIEVEMENT TEST–PRELIMINARY DRAFT

அடைவுச் சோதனை (முன்னோட்ட சோதனை)
கணிதம்

வகுப்பு :VIII std மதிப்பெண் : 70

கீழ்க்கண்ட வினாக்களுக்கு பொருத்தமான விடையை தேர்ந்தெடுத்து, 30 x 1 = 30

1. அடுத்தடுத்த மூன்று முழுக்களில் மூன்றாவது எண் _____

   அ. $x+1$ ஆ. $x+2$ இ. $x+3$ ஈ. $3x$

2. அடுத்தடுத்த மூன்று இயல் எண்களில் முதல் இரு எண்களின் கூடுதல் ____

   அ. $x+1$ ஆ. $x+2$ இ. $2x+1$ ஈ. $2x+2$

3. அடுத்தடுத்த இரு ஒற்றை எண்களின் வித்தியாசம்_____

   அ. $x+1$ ஆ. x இ. 1 ஈ. 2

4. அடுத்தடுத்த மூன்று முழுக்களில் இரண்டாம் எண்ணின் வர்க்கம்_____

   அ. x^2 ஆ. $(x+1)^2$ இ. $(x+2)^2$ ஈ. $(x+3)^2$

5. 20 ஐ ஓர் எண்ணுடன் கூட்டும்போது 75 கிடைக்கிறது எனில் இதன் சமன்பாடு_____

   அ. $x+20=75$ ஆ. $20x=75$ இ. $20=x+75$ ஈ. $x=20+75$

6. "ஓர் எண்ணிலிருந்து 15 ஐ நீக்ககிடைப்பது 10" என்பதன் சமன்பாடு _____

   அ. $x+15=10$ ஆ. $x+10=15$ இ. $x-15=10$ ஈ. $x-10=15$

7. ஓர் எண்ணின் மும்மடங்கு 12 என்பதன் சமன்பாடு _____

   அ. $x+3=12$ ஆ. $x^3=12$ இ. $3x=12$ ஈ. $\frac{x}{3}=12$

8. ஓர் எண்ணில் பாதி என்பது _____

   அ. $x+\frac{1}{2}$ ஆ. $x-\frac{1}{2}$ இ. $\frac{x}{2}$ ஈ. $2x$

9. ஓர் எண்ணின் மூன்றில் ஒரு பங்கு 16 என்பதன் சமன்பாடு_____

அ. $x+\frac{1}{3}=16$ ஆ. $\frac{3}{x}=16$ இ. $\frac{x}{3}=16$ ஈ. $x^3=16$

10. இரு எண்களின் கூடுதல் 60 என்பதை குறிக்கும் சமன்பாடு _____

அ. $x-y=60$ ஆ. $xy=60$ இ. $\frac{x}{y}=60$ ஈ. $x+y=60$

11. இரு எண்களின்வித்தியாசம் 15 என்பதை குறிப்பிடும் இயற்கணித சமன்பாடு_____

அ. $x-y=15$ ஆ. $xy=15$ இ. $\frac{x}{y}=15$ ஈ. $x+y=15$

12. ஒரு பின்னத்தில், பகுதி அதன் தொகுதியைவிட 2 அதிகம் என்பதன் பின்ன வடிவம்_____

அ. $\frac{x+2}{2}$ ஆ. $\frac{x}{x+2}$ இ. $\frac{2x}{x+2}$ ஈ. $\frac{x}{2(x+2)}$

13. ஒரு பின்னத்தில், பகுதி அதன் தொகுதியைவிட 5 குறைவு என்பதன் பின்ன வடிவம்_____

அ. $\frac{x-5}{5}$ ஆ. $\frac{5x}{x-5}$ இ. $\frac{x}{x-5}$ ஈ. $\frac{x}{(x+5)}$

14. மணியின் தற்போதைய வயது x எனில் ஐந்து வருடத்திற்கு முன் ரகுவின் வயது _____

அ. $5x$ ஆ. $5-x$ இ. $x-5$ ஈ. $x+5$

15. கௌரியின் தற்போதைய வயது x எனில் 7 வருடத்திற்கு பின் ராணியின் வயது_____

அ. $7x$ ஆ. $7-x$ இ. $x-7$ ஈ. $x+7$

16. தந்தையின் வயது மகனின் வயதைப்போல் ஐந்து மடங்கு மேலும் மகனின் வயது x எனில் தந்தையின் வயது_____

அ. $x+5$ ஆ. $x-5$ இ. $5x$ ஈ. x^5

17. ஒரு செவ்வகத்தின் நீளம் அகலத்தை விட இரு மடங்குஅதிகம். அகலம் y எனில் நீளம் _____

அ. $2+y$ ஆ. $2y$ இ. y^2 ஈ. $2-y$

18. ஒரு செவ்வகத்தின் அகலம் நீளத்தை விட 3 செ.மீ குறைவு. மேலும் நீளம் y எனில் அகலம்_____

அ. $3+y$ ஆ. $3y$ இ. $y-3$ ஈ. $3-y$

19. ஓர் ஈரிலக்க எண்ணில் ஒன்றாம் இலக்கம் x ஆக கொண்ட இயற்கணித கூற்று _____

அ. $10xy$ ஆ. xy இ. $10x+y$ ஈ. $10y+x$

20. ஓர் ஈரிலக்க எண்ணின் இலக்கங்களின் கூடுதல் 21 என்பதன் இயற்கணித சமன்பாடு _____

அ. $10xy+21$ ஆ. $x+y=21$ இ. $10x-y=21$ ஈ. $10y+x=21$

21. அடுத்தடுத்த மூன்று இயல் எண்களில்மூன்றாவது எண்ணிற்கும் முதல் எண்ணிற்கும் உள்ள வித்தியாசத்தின் வர்க்கம்_____

அ. 1 ஆ. 4 இ. 9 ஈ. 16

22. அடுத்தடுத்த ஐந்து ஒற்றை முழுக்களில்முதல் மூன்று எண்களின் கூடுதல் _____

அ. $3x+3$ ஆ. $3x+4$ இ. $3x+5$ ஈ. $3x+6$

23. “ஓர் எண்ணின் 5 மடங்குடன் 60 ஐ சேர்க்கும்போது 75” என்பதன் இயற்கணித சமன்பாடு _____

அ. $5x+75=60$ ஆ. $5x+75=-60$ இ. $5x+60=-75$ ஈ. $5x+60=75$

24. “சுதாவின் வயதின் ஏழு மடங்கில் இருந்து ஐந்தை கழித்தால் 30” என்பதன் இயற்கணித சமன்பாடு _____

அ. $x-5=30$ ஆ. $7x+5=30$ இ. $7x-5=30$ ஈ. $x-35=30$

25. ரகு, ரவி இவர்களின் தற்போதைய வயது x மற்றும் $3x$. ஐந்து வருடத்திற்கு பிறகு இருவரின் வயதுகளின் கூடுதல் _____

அ. $x+5$ ஆ. $3x+5$ இ. $4x+5$ ஈ. $4x+10$

26. முருகனின் வயதைவிட கண்ணனின் வயது இரு மடங்கு அதிகம் மேலும் தற்போது முருகனின் வயது y எனில் ஐந்து வருடத்திற்கு பிறகு கண்ணனின் வயது _____

அ. $y-5$ ஆ. $y+5$ இ. $2y+5$ ஈ. $2y-5$

27. இரு அடுத்தடுத்த மிகை ஒற்றை முழுக்களின் கூடுதல் 32. அதில் முதல் எண் 15எனில் இரண்டாம் எண் _____

அ. 16 ஆ. 17 இ.18 ஈ. 19

28. இரு அடுத்தடுத்த மிகை ஒற்றை முழுக்களின் கூடுதல் 16. அதில் இரண்டாம் எண் 9 எனில் முதல் எண் _____

அ. 5 ஆ. 6 இ.7 ஈ. 8

29. ஒரு செவ்வகத்தின் அகலம் நீளத்தைவிட 8 செ.மீ. குறைவு எனில் அதன் நீளம் மற்றும் அகலம் _____, _____

அ.(y, y-8) ஆ.(y, y+8) இ.(y, 8-y) ஈ. (8-y,y)

30. ஒரு செவ்வகத்தின் அகலம் நீளத்தைவிட 8 செ.மீ. குறைவு எனில் அதன் நீளம் மற்றும் அகலம் இவற்றின் கூடுதல்_____, _____

அ. 2y+8 ஆ. 2y-8 இ. y-8ஈ. y+8

II. கீழ்க்கண்ட வினாக்களுக்கு பொருத்தமான விடையை தேர்ந்தெடுத்து, 20 x 2 = 40

31. அடுத்தடுத்த மூன்று முழுக்களின் கூடுதல் 45 எனில் மூன்றாவது எண் _____

அ. 14 ஆ.15 இ. 16 ஈ. 17

32. அடுத்தடுத்தஇரு இயல் எண்களின் கூடுதல் 75 எனில் ஐந்தாம் எண்ணின் மதிப்பு _____

அ. 37 ஆ.38 இ. 40 ஈ. 41

33. இரு அடுத்தடுத்த மிகை ஒற்றை முழுக்களின் கூடுதல் 32 எனில் இரண்டாம் எண்ணின் வர்க்கம் _____

அ. 169 ஆ. 225 இ. 289 ஈ. 361

34. அடுத்தடுத்த மூன்று எண்களின் கூடுதல் 90 எனில் முதல் இரு எண்களின் விகிதம் _____

அ. 27:28 ஆ. 28:29 இ. 29:30 ஈ. 30:31

35. அடுத்தடுத்த மூன்று இயல் எண்களின் கூடுதல் 45 எனில் அத்தொடரில் அல்லாத எண் _____

அ. 14 ஆ. 15 இ. 16 ஈ. 13

36. ஓர் எண்ணை 60 உடன் கூட்டும்போது 75கிடைக்கிறதுஎனில் அந்த எண்ணின் மூன்று மடங்கு _____

அ. 45 ஆ. 60 இ. 75 ஈ. 90

37. ஒரு செவ்வகத்தின் அகலம்அதன் நீளத்தைவிட 8செ.மீ குறைவு.மேலும் செவ்வகத்தின்சுற்றளவு 60 செ.மீ எனில் அதன் நீளம் மற்றும் அகலம்_____

அ. (12,18) ஆ. (17, 13) இ.(19, 11) ஈ. (20, 12)

38. தாய், மகன் இவர்களின் வயதுகளின் கூடுதல் 46. பத்து ஆண்டுகளுக்கு பின்னர்தாயின் வயது மகனின் வயதைப்போல் இரண்டு மடங்கு எனில் தாயின் தற்போதையவயது _____

அ. 12 ஆ. 24 இ. 34 ஈ. 44

39. ஓர் ஈரிலக்க எண்ணின் இலக்கங்களின் கூடுதல் 10 .அந்த எண்ணில் இருந்து18 ஐக் கழித்தால் இலக்கங்கள் இடம் மாறிய எண் கிடைக்கும் எனில் அந்த எண் _____

அ. 55 ஆ.64 இ. 73 ஈ. 82

40. இரண்டு எண்களின் கூடுதல் 36. மேலும் அவற்றில் ஓர் எண் மற்றோர் எண்ணை விட 8 அதிகம் எனில், சிறிய எண் ----------

அ. 14 ஆ. 15 இ. 16 ஈ. 17

41. ஓர் எண் மற்றோர் எண்ணின் 7 மடங்கு ஆகும். அவற்றின் வித்தியாசம் 18 எனில், பெரிய எண் ----------

அ. 24 ஆ. 25 இ. 21 ஈ. 23

42. ஓர் மரத்துண்டின் நீளம் 2மீ ஆகும். அம்மரத்துண்டினை ஒரு தட்சர் இரண்டு துண்டுகளாக, அதாவது முதல் துண்டின் அளவானது இரண்டாம் துண்டின் அளவின் இரு மடக்கில் இருந்து 40 செ.மீ குறைவாக வருமாறு வெட்டநினைத்தார் எனில் சிறிய துண்டின் நீளம் ----------

அ. 120 செ.மீ ஆ. 100 செ.மீ இ. 90 செ.மீ ஈ. 80 செ.மீ

43. **ஒரு செவ்வக வடிவ** நிலத்தின் **நீளமானது அகலத்தை விட** 9 **மீ அதிகம். மேலும் அச்செவ்வக வடிவ** நிலத்தின் **சுற்றளவு** 154 **மீ எனில்**, நிலத்தின் **நீளம்** ----------

அ. 41 மீ ஆ. 42 மீ இ. 43 மீ ஈ. 44 மீ

44. ஒரு செவ்வகத்தின் நீளமானது அதன் அகலத்தில் மூன்றில் ஒரு பங்கு ஆகும். அச்செவ்வகத்தின் சுற்றளவு 64மீ எனில், செவ்வகத்தின் அகலம் ----------.

அ. 21 மீ ஆ. 22 மீ இ. 23 மீ ஈ. 24 மீ

45. ஒரு பின்னத்தின் பகுதியானது அதன் தொகுதியைவிட 3 அதிகம். அப்பின்னத்தின் தொகுதியுடன் 2 யையும், பகுதியுடன் 9 யையும் கூட்ட பின்னமானது 5/6 என மாறுகிறது எனில், முதலில் எடுத்துக்கொண்ட உண்மையான பின்னம்----------

அ. 48/51 ஆ. 49/51 இ. 50/51 ஈ. 52/51

46. **ஓர் ஈரிலக்க எண்ணின் இலக்கங்களின் கூடுதல் 9. அந்த எண்ணில் இருந்து 27 ஐக் கழித்தால் இலக்கங்கள் இடம் மாறிய எண் கிடைக்கும். எனில் அந்த எண் ----------**

அ. 61 ஆ. 62 இ. 63 ஈ. 64

47. **ஓர் ஈரிலக்க எண்ணின் இலக்கங்களின் கூடுதல்** 8**. அந்த எண்ணில் இருந்து** 18 **ஐ** கூட்டினால் **இலக்கங்கள் இடம் மாறிய எண் கிடைக்கும். எனில் அந்த எண்**----------

அ. 33 ஆ. 35 இ. 37 ஈ. 37

48. **ஓர் அம்மா தன்னுடைய மகளின் வயதினைப்போல் 5 மடங்கு வயதில் பெரியவர். இரண்டு ஆண்டுகளுக்கு பின், அம்மாவின் வயது மகளின் வயதைப்போல் நான்கு மடங்கு எனில், அவர்களின் தற்போதைய வயது----------**

அ. (6,30) ஆ. (6,35) இ. (6,40) ஈ. (6,45)

49. இராஜன் தன் வீட்டில் இருந்து இரு சக்கர வாகனத்தில் மணிக்கு 35 கி.மீ வேகத்தில் சென்று தன்னுடைய அலுவலகத்தை 5 நிமிடம் தாமதமாக சென்றடைகிறார். அவர் மணிக்கு 50 கி.மீ வேகத்தில் சென்றிருந்தால் அலுவலகத்தை 4 நிமிடம் முன்னதாகவே சென்றடைந்திருப்பார் எனில் அவருடைய அலுவலகம், வீட்டிலிருந்து எவ்வளவு தூரம்----------

அ. 15.5 கி.மீ ஆ. 16.5 கி.மீ இ. 17.5 கி.மீ ஈ. 18.5 கி.மீ

50. ஒரு தொடர்வண்டி மணிக்கு 60 கி.மீ வேகத்தில் சென்றால் சேரவேண்டிய இடத்திற்கு 15 நிமிடங்கள் தாமதமாக சென்று சேரும். ஆனால் அவ்வண்டி மணிக்கு 85 கி.மீ வீக்கத்தில் சென்றால் சேரவேண்டிய இடத்திற்கு 4 நிமிடங்கள் மட்டுமே தாமதமாக சென்று சேரும் எனில் தொடர்வண்டி கடக்க வேண்டிய தூரம்----------

அ. 37.5 கி.மீ ஆ. 37.4 கி.மீ இ. 37.3 கி.மீ ஈ. 37.2 கி.மீ

APPENDIX-III

ACHIEVEMENT TEST–PRE TEST

அடைவுச்சோதனை (முன் சோதனை)

கணிதம்

வகுப்பு : VIII std மதிப்பெண் : 50

I.கீழ்ககண்ட வினாக்களுக்கு பொருத்தமான விடையை தேர்ந்தெடுத்து, கொடுக்கப்பட்டுள்ள கட்டத்தினுள் எழுதுக. உதாரணமாக **அ** **30 x 1 = 30**

1. அடுத்தடுத்த மூன்று முழுக்களில் மூன்றாவது எண் _____
   அ. $x+1$ ஆ. $x+2$ இ. $x+3$ ஈ. $3x$

2. அடுத்தடுத்த மூன்று இயல் எண்களில் முதல் இரு எண்களின் கூடுதல் ____
   அ. $x+1$ ஆ. $x+2$ இ. $2x+1$ ஈ. $2x+2$

3. அடுத்தடுத்த இரு ஒற்றை எண்களின் வித்தியாசம்_____
   அ. $x+1$ ஆ. x இ. 1 ஈ. 2

4. அடுத்தடுத்த மூன்று முழுக்களில் இரண்டாம் எண்ணின் வர்க்கம்_____
   அ. x^2 ஆ. $(x+1)^2$ இ. $(x+2)^2$ ஈ. $(x+3)^2$

5. 20 ஐ ஓர் எண்ணுடன் கூட்டும்போது 75 கிடைக்கிறது எனில் இதன் சமன்பாடு_____
   அ. $x+20=75$ ஆ. $20x=75$ இ. $20=x+75$ ஈ. $x=20+75$

6. "ஓர் எண்ணிலிருந்து 15 ஐ நீக்ககிடைப்பது 10" என்பதன் சமன்பாடு _____
   அ. $x+15=10$ ஆ. $x+10=15$ இ. $x-15=10$ ஈ. $x-10=15$

7. ஓர் எண்ணின் மும்மடங்கு 12 என்பதன் சமன்பாடு _____
   அ. $x+3=12$ ஆ. $x^3=12$ இ. $3x=12$ ஈ. $\frac{x}{3}=12$

8. ஓர் எண்ணில் பாதி என்பது _____
   அ. $x+\frac{1}{2}$ ஆ. $x-\frac{1}{2}$ இ. $\frac{x}{2}$ ஈ. $2x$

9. ஓர் எண்ணின் மூன்றில் ஒரு பங்கு 16 என்பதன் சமன்பாடு_____
   அ. $x+\frac{1}{3}=16$ ஆ. $\frac{3}{x}=16$ இ. $\frac{x}{3}=16$ ஈ. $x^3=16$

10. இரு எண்களின் கூடுதல் 60 என்பதை குறிக்கும் சமன்பாடு _____
    அ. $x-y=60$ ஆ. $xy=60$ இ. $\frac{x}{y}=60$ ஈ. $x+y=60$

11. இரு எண்களின்வித்தியாசம் 15 என்பதை குறிப்பிடும் இயற்கணித சமன்பாடு_____

அ. $x-y=15$ ஆ. $xy=15$ இ. $\frac{x}{y}=15$ ஈ. $x+y=15$

12. ஒரு பின்னத்தில், பகுதி அதன் தொகுதியைவிட 2 அதிகம் என்பதன் பின்ன வடிவம்_____

அ. $\frac{x+2}{2}$ ஆ. $\frac{x}{x+2}$ இ. $\frac{2x}{x+2}$ ஈ. $\frac{x}{2(x+2)}$

13. ஒரு பின்னத்தில், பகுதி அதன் தொகுதியைவிட 5 குறைவு என்பதன் பின்ன வடிவம்_____

அ. $\frac{x-5}{5}$ ஆ. $\frac{5x}{x-5}$ இ. $\frac{x}{x-5}$ ஈ. $\frac{x}{(x+5)}$

14. மணியின் தற்போதைய வயது x எனில் ஐந்து வருடத்திற்கு முன் ரகுவின் வயது _____

அ. $5x$ ஆ. $5-x$ இ. $x-5$ ஈ. $x+5$

15. கௌரியின் தற்போதைய வயது x எனில் 7 வருடத்திற்கு பின் ராணியின் வயது_____

அ. $7x$ ஆ. $7-x$ இ. $x-7$ ஈ. $x+7$

16. தந்தையின் வயது மகனின் வயதைப்போல் ஐந்து மடங்கு மேலும் மகனின் வயது x எனில் தந்தையின் வயது_____

அ. $x+5$ ஆ. $x-5$ இ. $5x$ ஈ. x^5

17. ஒரு செவ்வகத்தின் நீளம் அகலத்தை விட இரு மடங்குஅதிகம். அகலம் y எனில் நீளம் _____

அ. $2+y$ ஆ. $2y$ இ. y^2 ஈ. $2-y$

18. ஒரு செவ்வகத்தின் அகலம் நீளத்தை விட 3 செ.மீ குறைவு. மேலும் நீளம் y எனில் அகலம்_____

அ. $3+y$ ஆ. $3y$ இ. $y-3$ ஈ. $3-y$

19. ஓர் ஈரிலக்க எண்ணில் ஒன்றாம் இலக்கம் x ஆக கொண்ட இயற்கணித கூற்று _____

அ. $10xy$ ஆ. xy இ. $10x+y$ ஈ. $10y+x$

20. ஓர் ஈரிலக்க எண்ணின் இலக்கங்களின் கூடுதல் 21 என்பதன் இயற்கணித சமன்பாடு _____

அ. $10xy+21$ ஆ. $x+y=21$ இ. $10x-y=21$ ஈ. $10y+x=21$

21. “ஓர் எண்ணின் 5 மடங்குடன் 60 ஐ சேர்க்கும்போது 75” என்பதன் இயற்கணித சமன்பாடு _____

அ. $5x+75=60$ ஆ. $5x+75=-60$ இ. $5x+60=-75$ ஈ. $5x+60=75$

22. “சுதாவின் வயதின் ஏழு மடங்கில் இருந்து ஐந்தை கழித்தால் 30” என்பதன் இயற்கணித சமன்பாடு _____

அ. $x-5=30$ ஆ. $7x+5=30$ இ. $7x-5=30$ ஈ. $x-35=30$

23. ரகு, ரவி இவர்களின் தற்போதைய வயது x மற்றும் $3x$. ஐந்து வருடத்திற்கு பிறகு இருவரின் வயதுகளின் கூடுதல் _____

அ. $x+5$ ஆ. $3x+5$ இ. $4x+5$ ஈ. $4x+10$

24. முருகனின் வயதைவிட கண்ணனின் வயது இரு மடங்கு அதிகம் மேலும் தற்போது முருகனின் வயது y எனில் ஐந்து வருடத்திற்கு பிறகு கண்ணனின் வயது _____

அ. $y-5$ ஆ. $y+5$ இ. $2y+5$ ஈ. $2y-5$

25. இரு அடுத்தடுத்த மிகை ஒற்றை முழுக்களின் கூடுதல் 16. அதில் இரண்டாம் எண் 9 எனில் முதல் எண் _____

அ. 5 ஆ. 6 இ.7 ஈ. 8

26. ஒரு செவ்வகத்தின் அகலம் நீளத்தைவிட 8 செ.மீ. குறைவு எனில் அதன் நீளம் மற்றும் அகலம் _____, _____

அ.(y, y-8) ஆ.(y, y+8) இ.(y, 8-y) ஈ. (8-y,y)

27. ஒரு செவ்வகத்தின் அகலம் நீளத்தைவிட 8 செ.மீ. குறைவு எனில் அதன் நீளம் மற்றும் அகலம் இவற்றின் கூடுதல்_____, _____

அ. 2y+8 ஆ. 2y-8 இ. y-8 ஈ. y+8

28. அடுத்தடுத்த மூன்று முழுக்களின் கூடுதல் 45 எனில் மூன்றாவது எண் _____

அ. 14 ஆ.15 இ. 16 ஈ. 17

29. அடுத்தடுத்த இரு இயல் எண்களின் கூடுதல் 75 எனில் ஐந்தாம் எண்ணின் மதிப்பு _____

அ. 37 ஆ.38 இ. 40 ஈ. 41

30. இரு அடுத்தடுத்த மிகை ஒற்றை முழுக்களின் கூடுதல் 32 எனில் இரண்டாம் எண்ணின் வர்க்கம் _____

அ. 169 ஆ. 225 இ. 289 ஈ. 361

II.கீழ்ககண்ட வினாக்களுக்கு பொருத்தமான விடையை தேர்ந்தெடுத்து, 10 x 2 = 20
கொடுக்கப்பட்டுள்ள கட்டத்தினுள் எழுதுக. உதாரணமாக அ

31. இரண்டு எண்களின் கூடுதல் 36. மேலும் அவற்றில் ஓர் எண் மற்றோர் எண்ணை விட 8 அதிகம் எனில், சிறிய எண் ----------

அ. 14 ஆ. 15 இ. 16 ஈ. 17

32. ஓர் எண் மற்றோர் எண்ணின் 7 மடங்கு ஆகும். அவற்றின் வித்தியாசம் 18 எனில், பெரிய எண் ----------

அ. 24 ஆ. 25 இ. 21 ஈ. 23

33. ஓர் மரத்துண்டின் நீளம் 2மீ ஆகும். அம்மரத்துண்டினை ஒரு தட்சர் இரண்டு துண்டுகளாக, அதாவது முதல் துண்டின் அளவானது இரண்டாம் துண்டின் அளவின் இரு மடக்கில் இருந்து 40 செ.மீ குறைவாக வருமாறு வெட்டநினைத்தார் எனில் சிறிய துண்டின் நீளம் ----------

அ. 120 செ.மீ ஆ. 100 செ.மீ இ. 90 செ.மீ ஈ. 80 செ.மீ

34. **ஒரு செவ்வக வடிவ** நிலத்தின் **நீளமானது அகலத்தை விட** 9 **மீ அதிகம். மேலும் அச்செவ்வக வடிவ** நிலத்தின் **சுற்றளவு** 154 **மீ எனில்**, நிலத்தின் **நீளம்** ----------

அ. 41 மீ ஆ. 42 மீ இ. 43 மீ ஈ. 44 மீ

35. ஒரு செவ்வகத்தின் நீளமானது அதன் அகலத்தில் மூன்றில் ஒரு பங்கு ஆகும். அச்செவ்வகத்தின் சுற்றளவு 64மீ எனில், செவ்வகத்தின் அகலம் ----------.

அ. 21 மீ ஆ. 22 மீ இ. 23 மீ ஈ. 24 மீ

36. ஒரு பின்னத்தின் பகுதியானது அதன் தொகுதியைவிட 3 அதிகம். அப்பின்னத்தின் தொகுதியுடன் 2 யையும், பகுதியுடன் 9 யையும் கூட்ட பின்னமானது 5/6 என மாறுகிறது எனில், முதலில் எடுத்துக்கொண்ட உண்மையான பின்னம்----------

அ. 48/51 ஆ. 49/51 இ. 50/51 ஈ. 52/51

37. **ஓர் ஈரிலக்க எண்ணின் இலக்கங்களின் கூடுதல் 9. அந்த எண்ணில் இருந்து 27 ஐக் கழித்தால் இலக்கங்கள் இடம் மாறிய எண் கிடைக்கும். எனில் அந்த எண் ----------**

அ. 61 ஆ. 62 இ. 63 ஈ. 64

38. **ஓர் ஈரிலக்க எண்ணின் இலக்கங்களின் கூடுதல் 8. அந்த எண்ணில் இருந்து 18 ஐ** கூட்டினால் **இலக்கங்கள் இடம் மாறிய எண் கிடைக்கும். எனில் அந்த எண்----------**

அ. 33 ஆ. 35 இ. 37 ஈ. 37

39. **ஓர் அம்மா தன்னுடைய மகளின் வயதினைப்போல் 5 மடங்கு வயதில் பெரியவர். இரண்டு ஆண்டுகளுக்கு பின், அம்மாவின் வயது மகளின் வயதைப்போல் நான்கு மடங்கு எனில், அவர்களின் தற்போதைய வயது----------**

அ. (6,30) ஆ. (6,35) இ. (6,40) ஈ. (6,45)

40. இராஜன் தன் வீட்டில் இருந்து இரு சக்கர வாகனத்தில் மணிக்கு 35 கி.மீ வேகத்தில் சென்று தன்னுடைய அலுவலகத்தை 5 நிமிடம் தாமதமாக சென்றடைகிறார். அவர் மணிக்கு 50 கி.மீ வேகத்தில் சென்றிருந்தால் அலுவலகத்தை 4 நிமிடம் முன்னதாகவே சென்றடைந்திருப்பார் எனில் அவருடைய அலுவலகம், வீட்டிலிருந்து எவ்வளவு தூரம்----------

அ. 15.5 கி.மீ ஆ. 16.5 கி.மீ இ. 17.5 கி.மீ ஈ. 18.5 கி.மீ

APPENDIX-IV
ACHIEVEMENT TEST–POST TEST

அடைவுச்சோதனை (இறுதி- சோதனை)
கணிதம்

வகுப்பு :VIII std மதிப்பெண் : 50

I.கீழ்ககண்ட வினாக்களுக்கு பொருத்தமான விடையை தேர்ந்தெடுத்து, கொடுக்கப்பட்டுள்ள கட்டத்தினுள் எழுதுக. உதாரணமாக **அ** **30 x 1 = 30**

1. அடுத்தடுத்த இரு ஒற்றை எண்களின் வித்தியாசம்_____
   அ. $x+1$ ஆ. x இ. 1 ஈ. 2

2. 20 ஐ ஓர் எண்ணுடன் கூட்டும்போது 75 கிடைக்கிறது எனில் இதன் சமன்பாடு_____
   அ. $x+20=75$ ஆ. $20x=75$ இ. $20=x+75$ ஈ. $x=20+75$

3. "ஓர் எண்ணிலிருந்து 15 ஐ நீக்ககிடைப்பது 10" என்பதன் சமன்பாடு _____
   அ. $x+15=10$ ஆ. $x+10=15$ இ. $x-15=10$ ஈ. $x-10=15$

4. அடுத்தடுத்த மூன்று இயல் எண்களில் முதல் இரு எண்களின் கூடுதல் ____
   அ. $x+1$ ஆ. $x+2$ இ. $2x+1$ ஈ. $2x+2$

5. ஓர் எண்ணில் பாதி என்பது _____
   அ. $x+\frac{1}{2}$ ஆ. $x-\frac{1}{2}$ இ. $\frac{x}{2}$ ஈ. $2x$

6. ஓர் எண்ணின் மூன்றில் ஒரு பங்கு 16 என்பதன் சமன்பாடு_____
   அ. $x+\frac{1}{3}=16$ ஆ. $\frac{3}{x}=16$ இ. $\frac{x}{3}=16$ ஈ. $x^3=16$

7. இரு எண்களின் கூடுதல் 60 என்பதை குறிக்கும் சமன்பாடு _____
   அ. $x-y=60$ ஆ. $xy=60$ இ. $\frac{x}{y}=60$ ஈ. $x+y=60$

8. ஒரு பின்னத்தில், பகுதி அதன் தொகுதியைவிட 2 அதிகம் என்பதன் பின்ன வடிவம்_____
   அ. $\frac{x+2}{2}$ ஆ. $\frac{x}{x+2}$ இ. $\frac{2x}{x+2}$ ஈ. $\frac{x}{2(x+2)}$

9. அடுத்தடுத்த மூன்று முழுக்களில் மூன்றாவது எண் _____
   அ. $x+1$ ஆ. $x+2$ இ. $x+3$ ஈ. $3x$

10. ஒரு பின்னத்தில், பகுதி அதன் தொகுதியைவிட 5 குறைவு என்பதன் பின்ன வடிவம்_____

அ. $\frac{x-5}{5}$ ஆ. $\frac{5x}{x-5}$ இ. $\frac{x}{x-5}$ ஈ. $\frac{x}{(x+5)}$

11. ஓர் எண்ணின் மும்மடங்கு 12 என்பதன் சமன்பாடு _____

அ. $x+3=12$ ஆ. $x^3=12$ இ. $3x=12$ ஈ. $\frac{x}{3}=12$

12. மணியின் தற்போதைய வயது x எனில் ஐந்து வருடத்திற்கு முன் ரகுவின் வயது _____

அ. $5x$ ஆ. $5-x$ இ. $x-5$ ஈ. $x+5$

13. அடுத்தடுத்த மூன்று முழுக்களில் இரண்டாம் எண்ணின் வர்க்கம்_____

அ. x^2 ஆ. $(x+1)^2$ இ. $(x+2)^2$ ஈ. $(x+3)^2$

14. கௌரியின் தற்போதைய வயது x எனில் 7 வருடத்திற்கு பின் ராணியின் வயது_____

அ. $7x$ ஆ. $7-x$ இ. $x-7$ ஈ. $x+7$

15. ஒரு செவ்வகத்தின் நீளம் அகலத்தை விட இரு மடங்குஅதிகம். அகலம் y எனில் நீளம் _____

அ. $2+y$ ஆ. $2y$ இ. y^2 ஈ. $2-y$

16. இரு எண்களின்வித்தியாசம் 15 என்பதை குறிப்பிடும் இயற்கணித சமன்பாடு_____

அ. $x-y=15$ ஆ. $xy=15$ இ. $\frac{x}{y}=15$ ஈ. $x+y=15$

17. தந்தையின் வயது மகனின் வயதைப்போல் ஐந்து மடங்கு மேலும் மகனின் வயது x எனில் தந்தையின் வயது_____

அ. $x+5$ ஆ. $x-5$ இ. $5x$ ஈ. x^5

18. ஒரு செவ்வகத்தின் அகலம் நீளத்தை விட 3 செ.மீ குறைவு. மேலும் நீளம் y எனில் அகலம்_____

அ. $3+y$ ஆ. $3y$ இ. $y-3$ ஈ. $3-y$

19. ஓர் ஈரிலக்க எண்ணில் ஒன்றாம் இலக்கம் x ஆக கொண்ட இயற்கணித கூற்று _____

அ. $10xy$ ஆ. xy இ. $10x+y$ ஈ. $10y+x$

20. "ஓர் எண்ணின் 5 மடங்குடன் 60 ஐ சேர்க்கும்போது 75" என்பதன் இயற்கணித சமன்பாடு _____

அ. $5x+75=60$ ஆ. $5x+75=-60$ இ. $5x+60=-75$ ஈ. $5x+60=75$

21. “சுதாவின் வயதின் ஏழு மடங்கில் இருந்து ஐந்தை கழித்தால் 30” என்பதன் இயற்கணித சமன்பாடு _____

அ. $x-5=30$ ஆ. $7x+5=30$ இ. $7x-5=30$ ஈ. $x-35=30$

22. இரு அடுத்தடுத்த மிகை ஒற்றை முழுக்களின் கூடுதல் 32 எனில் இரண்டாம் எண்ணின் வர்க்கம் _____

அ. 169 ஆ. 225 இ. 289 ஈ. 361

23. ஓர் ஈரிலக்க எண்ணின் இலக்கங்களின் கூடுதல் 21 என்பதன் இயற்கணித சமன்பாடு _____

அ. $10xy+21$ ஆ. $x+y=21$ இ. $10x-y=21$ ஈ. $10y+x=21$

24. ரகு, ரவி இவர்களின் தற்போதைய வயது x மற்றும் $3x$. ஐந்து வருடத்திற்கு பிறகு இருவரின் வயதுகளின் கூடுதல் _____

அ. $x+5$ ஆ. $3x+5$ இ. $4x+5$ ஈ. $4x+10$

25. இரு அடுத்தடுத்த மிகை ஒற்றை முழுக்களின் கூடுதல் 16. அதில் இரண்டாம் எண் 9 எனில் முதல் எண் _____

அ. 5 ஆ. 6 இ. 7 ஈ. 8

26. ஒரு செவ்வகத்தின் அகலம் நீளத்தைவிட 8 செ.மீ. குறைவு எனில் அதன் நீளம் மற்றும் அகலம் _____, _____

அ.(y, y-8) ஆ.(y, y+8) இ.(y, 8-y) ஈ. (8-y,y)

27. முருகனின் வயதைவிட கண்ணனின் வயது இரு மடங்கு அதிகம் மேலும் தற்போது முருகனின் வயது y எனில் ஐந்து வருடத்திற்கு பிறகு கண்ணனின் வயது _____

அ. $y-5$ ஆ. $y+5$ இ. $2y+5$ ஈ. $2y-5$

28. அடுத்தடுத்த இரு இயல் எண்களின் கூடுதல் 75 எனில் ஐந்தாம் எண்ணின் மதிப்பு _____

அ. 37 ஆ.38 இ. 40 ஈ. 41

29. ஒரு செவ்வகத்தின் அகலம் நீளத்தைவிட 8 செ.மீ. குறைவு எனில் அதன் நீளம் மற்றும் அகலம் இவற்றின் கூடுதல்_____, _____

அ. 2y+8 ஆ. 2y-8 இ. y-8 ஈ. y+8

30. அடுத்தடுத்த மூன்று முழுக்களின் கூடுதல் 45 எனில் மூன்றாவது எண் _____

அ. 14 ஆ.15 இ. 16 ஈ. 17

II.கீழ்ககண்ட வினாக்களுக்கு பொருத்தமான விடையை தேர்ந்தெடுத்து, 10 x 2 = 20
கொடுக்கப்பட்டுள்ள கட்டத்தினுள் எழுதுக. உதாரணமாக அ

31. இரண்டு எண்களின் கூடுதல் 36. மேலும் அவற்றில் ஓர் எண் மற்றோர் எண்ணை விட 8 அதிகம் எனில், சிறிய எண் ----------

அ. 14 ஆ. 15 இ. 16 ஈ. 17

32. **ஒரு செவ்வக வடிவ** நிலத்தின் **நீளமானது அகலத்தை விட** 9 **மீ அதிகம். மேலும் அச்செவ்வக வடிவ** நிலத்தின் **சுற்றளவு** 154 **மீ எனில்**, நிலத்தின் **நீளம்** ----------

அ. 41 மீ ஆ. 42 மீ இ. 43 மீ ஈ. 44 மீ

33. இராஜன் தன் வீட்டில் இருந்து இரு சக்கர வாகனத்தில் மணிக்கு 35 கி.மீ வேகத்தில் சென்று தன்னுடைய அலுவலகத்தை 5 நிமிடம் தாமதமாக சென்றடைகிறார். அவர் மணிக்கு 50 கி.மீ வேகத்தில் சென்றிருந்தால் அலுவலகத்தை 4 நிமிடம் முன்னதாகவே சென்றடைந்திருப்பார் எனில் அவருடைய அலுவலகம், வீட்டிலிருந்து எவ்வளவு தூரம்----------

அ. 15.5 கி.மீ ஆ. 16.5 கி.மீ இ. 17.5 கி.மீ ஈ. 18.5 கி.மீ

34. ஒரு பின்னத்தின் பகுதியானது அதன் தொகுதியைவிட 3 அதிகம். அப்பின்னத்தின் தொகுதியுடன் 2 யையும், பகுதியுடன் 9 யையும் கூட்ட பின்னமானது 5/6 என மாறுகிறது எனில், முதலில் எடுத்துக்கொண்ட உண்மையான பின்னம்----------

அ. 48/51 ஆ. 49/51 இ. 50/51 ஈ. 52/51

35. ஓர் மரத்துண்டின் நீளம் 2மீ ஆகும். அம்மரத்துண்டினை ஒரு தட்சர் இரண்டு துண்டுகளாக, அதாவது முதல் துண்டின் அளவானது இரண்டாம் துண்டின் அளவின் இரு மடக்கில் இருந்து 40 செ.மீ குறைவாக வருமாறு வெட்டநினைத்தார் எனில் சிறிய துண்டின் நீளம் ----------

அ. 120 செ.மீ ஆ. 100 செ.மீ இ. 90 செ.மீ ஈ. 80 செ.மீ

36. ஒரு செவ்வகத்தின் நீளமானது அதன் அகலத்தில் மூன்றில் ஒரு பங்கு ஆகும். அச்செவ்வகத்தின் சுற்றளவு 64மீ எனில், செவ்வகத்தின் அகலம் ----------.

அ. 21 மீ ஆ. 22 மீ இ. 23 மீ ஈ. 24 மீ

37. **ஓர் ஈரிலக்க எண்ணின் இலக்கங்களின் கூடுதல் 9. அந்த எண்ணில் இருந்து 27 ஐக் கழித்தால் இலக்கங்கள் இடம் மாறிய எண் கிடைக்கும். எனில் அந்த எண் ----------**

அ. 61 ஆ. 62 இ. 63 ஈ. 64

38. ஓர் எண் மற்றோர் எண்ணின் 7 மடங்கு ஆகும். அவற்றின் வித்தியாசம் 18 எனில், பெரிய எண் ----------

அ. 24 ஆ. 25 இ. 21 ஈ. 23

39. **ஓர் அம்மா தன்னுடைய மகளின் வயதினைப்போல் 5 மடங்கு வயதில் பெரியவர். இரண்டு ஆண்டுகளுக்கு பின், அம்மாவின் வயது மகளின் வயதைப்போல் நான்கு மடங்கு எனில், அவர்களின் தற்போதைய வயது----------**

அ. (6,30) ஆ. (6,35) இ. (6,40) ஈ. (6,45)

40. **ஓர் ஈரிலக்க எண்ணின் இலக்கங்களின் கூடுதல் 8. அந்த எண்ணில் இருந்து 18 ஐ** கூட்டினால் **இலக்கங்கள் இடம் மாறிய எண் கிடைக்கும். எனில் அந்த எண்----------**

அ. 33 ஆ. 35 இ. 37 ஈ. 37

APPENDIX-V

SELF LEARNING MATERIAL

1. STAR உத்தி

S - வாக்கிய கணக்கினை ஆராய்தல் (Search the word problem)

T - **கணித குறியீடாகவோ அல்லது படமாகவோ மாற்றுதல்**

(Translate the problem)

A - தீர்வு காணுதல் (Answer the problem)

R - தீர்வினை மீலாய்வு செய்தல் (Review the solution).

2. இரண்டு எண்களின் கூடுதல் 36. மேலும் அவற்றில் ஓர் எண் மற்றோர் எண்ணை விட 8 அதிகம் எனில், அந்த எண்களைக் காண்க.

(i) வாக்கியக் கணக்கினை ஆராய்தல்

கொடுக்கப்பட்டது : 1.இரு எண்களின் கூடுதல் 36

2.ஓர் எண் மற்றோர் எண்ணை விட 8 அதிகம்

கேட்கப்பட்டது : 1.அந்த எண்களைக் காண்க

(ii) கணித குறியீடாகவோ அல்லது படமாகவோ மாற்றுதல்:

சிறிய எண் x என்க

பெரிய எண் x+8 என்க

இரு எண்களின் கூடுதல் = 36

அதாவது x + (x + 8) = 36

(iii) கணக்கிற்கு தீர்வு காணுதல்:

$$x + x + 8 = 36$$
$$2x + 8 = 36$$
$$2x = 36 - 8$$
$$2x = 28$$
$$x = \frac{28}{2}$$
$$x = 14$$

சிறிய எண் x = 14

பெரிய எண் x+8 = 14 + 8

=22

(iv) **தீர்வினை மீளாய்வு செய்தல்**:

இரு எண்களின் கூடுதல்

$$x + x + 8 = 36$$
$$14 + 14 + 8 = 36$$
$$14 + 22 = 36$$
$$36 = 36$$

3. **ஓர் எண் மற்றோர் எண்ணின் 7 மடங்கு ஆகும். அவற்றின் வித்தியாசம் 18 எனில் அவ்வெண்களைக் காண்க.**

(i) **வாக்கியக் கணக்கினை ஆராய்தல்**

கொடுக்கப்பட்டது : 1. ஓர் எண் மற்றோர் எண்ணின் 7 மடங்கு

2. அவற்றின் வித்தியாசம் 18

கேட்கப்பட்டது : 1. அந்த எண்களைக் காண்க

(ii) **கணித குறியீடாகவோ அல்லது படமாகவோ மாற்றுதல்:**

சிறிய எண் x என்க

பெரிய எண் க்ஸ் 7x என்க

இரு எண்களுக்கு இடையே உள்ள வித்தியாசம் 18

$$7x - x = 18$$

(iii) **கணக்கிற்கு தீர்வு காணுதல்:**

$7x - x = 18$

$6x = 18$

$x = \frac{18}{6}$

$x = 3$

சிறிய எண் x = 3

பெரிய எண் 7x = 7x3 = 21

(iv) **தீர்வினை மீளாய்வு செய்தல்**:

இரு எண்களுக்கு இடையே உள்ள வித்தியாசம்

$7x - x = 18$

$7(3) - 3 = 18$

$21 - 3 = 18$

$18 = 18$

4. **ஓர் மரத்துண்டின் நீளம் 2மீ ஆகும். அம்மரத்துண்டினை ஒரு தட்சர் இரண்டு துண்டுகளாக, அதாவது முதல் துண்டின் அளவானது இரண்டாம் துண்டின் அளவின் இரு மடக்கில் இருந்து 40 செ.மீ குறைவாக வருமாறு வெட்டநினைத்தார் எனில் சிறிய துண்டின் நீளம் எவ்வளவு.**

(i) **வாக்கியக் கணக்கினை ஆராய்தல்**

கொடுக்கப்பட்டது :

1. ஓர் மரத்துண்டின் நீளம் 2மீ அதாவது 200 செ .மீ
2. முதல் துண்டின் அளவானது இரண்டாம் துண்டின் அளவின் இரு மடக்கில் இருந்து 40 செ.மீ குறைவு.

கேட்கப்பட்டது : 1. சிறிய துண்டின் நீளம்

(ii) **கணித குறியீடாகவோ அல்லது படமாகவோ மாற்றுதல்:**

முதல் துண்டின் நீளம் x செ.மீ என்க.

இரண்டாம் துண்டின் நீளம் (200 -x) செ.மீ என்க.

முதல் துண்டின் அளவானது இரண்டாம் துண்டின் அளவின் இரு மடக்கில் இருந்து 40 செ.மீ குறைவு.

$x = 2(200 - x) - 40$

(v) **கணக்கிற்கு தீர்வு காணுதல்:**

$x = 2(200 - x) - 40$

$x = 400 - 2x - 40$

$x + 2x = 360$

$3x = 360$

$x = \frac{360}{3}$

$x = 120$

முதல் துண்டின் நீளம் x=120 செ.மீ

இரண்டாம் துண்டின் நீளம் (200 -x)= 200-120= 80 செ.மீ

சிறிய துண்டின் நீளம் =80 செ.மீ

(vi) **தீர்வினை மீளாய்வு செய்தல்**:

மரத்துண்டின் நீளம் = 200 செ .மீ

முதல் துண்டின் நீளம் +இரண்டாம் துண்டின் நீளம் = 200 செ.மீ

120+80=200

200=200

5. **அடுத்தடுத்த மூன்று ஒற்றை எண்களின் கூடுதல் 75 எனில்,அவற்றுள் எது பெரிய எண்.**

(I) **வாக்கியக் கணக்கினை ஆராய்தல்**

கொடுக்கப்பட்டது : 1. அடுத்தடுத்த மூன்று ஒற்றை எண்களின் கூடுதல் 75.

கேட்கப்பட்டது : 1. பெரிய எண் காண்க

(vii) **கணித குறியீடாகவோ அல்லது படமாகவோ மாற்றுதல்:**

அடுத்தடுத்த மூன்று ஒற்றை எண்கள் $x, x+2, x+4$ **என்க.**

அடுத்தடுத்த மூன்று ஒற்றை எண்களின் **கூடுதல் = 75**

$x + x + 2 + x + 4 = 75$

(viii) **கணக்கிற்கு தீர்வு காணுதல்:**

$x + x + 2 + x + 4 = 75$

$3x + 6 = 75$

$3x = 69$

$x = \frac{69}{3}$

$x = 23$

முதல் எண் x = 23

இரண்டாம் எண் x +2 = 25

மூன்றாம் எண் x +4 = 23 + 4 = 27

பெரிய எண்= 27

(ix) ***தீர்வினை மீளாய்வு செய்தல்***:

$x + x + 2 + x + 4 = 75$

$23 + 23 + 2 + 23 + 4 = 75$

$75 = 75$

6. அடுத்தடுத்து வரும் மூன்று முழுக்களின் கூடுதல் 45. அந்த முழுக்களைக் காண்க.

(i) **வாக்கியக் கணக்கினை ஆராய்தல்**

1. அடுத்தடுத்த மூன்று முழுக்கள் $x, x+1, x+2$ என்க.
2. மூன்று முழுக்களின் கூடுதல் 45.
3. மூன்று முழுக்களையும் காணவேண்டும்.

(ii) **வாக்கியக் கணக்கினை கணிதக் குறியீடுகளாக மாற்றுதல்**

$x + x + 1 + x + 2 = 45$

(iii) **கணக்கிற்கு தீர்வு காணுதல்**

$x + x + 1 + x + 2 = 45$

$3x + 3 = 45$

$3x = 45 - 3$

$3x = 42$

$x = \frac{42}{3}$

$x = 14$

முதல் எண் x=14

இரண்டாம் எண் $x + 1 = 15$

மூன்றாம் எண் $x + 2 = 16$

(iv) **தீர்வினை மீளாய்வு செய்தல்**

$3x + 3 = 45$

$3(14) + 3 = 45$

$42 + 3 = 45$

$45 = 45$

7. **அடுத்தடுத்த மூன்று எண்களின் கூடுதல் 90. அவ்வெண்களைக் காண்க.**

(i) **வாக்கியக் கணக்கினை ஆராய்தல்**

1. அடுத்தடுத்த மூன்று எண்கள் $x, x+1, x+2$ என்க.
2. மூன்று எண்களின் கூடுதல் 90.
3. மூன்று எண்களையும் காணவேண்டும்.

(ii) **வாக்கியக் கணக்கினை கணிதக் குறியீடுகளாக மாற்றுதல்**

$x + x + 1 + x + 2 = 90$

(iii) **கணக்கிற்கு தீர்வு காணுதல்**

$$x + x + 1 + x + 2 = 90$$
$$3x + 3 = 90$$
$$3x = 90 - 3$$
$$3x = 87$$
$$x = \frac{87}{3}$$
$$x = 29$$

முதல் எண் $x = 29$

இரண்டாம் எண் $x + 1 = 30$

மூன்றாம் எண் $x + 2 = 31$

(iv) தீர்வினை மீளாய்வு செய்தல்

$$3x + 3 = 90$$
$$3(29) + 3 = 90$$
$$87 + 3 = 90$$
$$90 = 90$$

8. அடுத்தடுத்து வரும் இரு இயல் எண்களின் கூடுதல் 75 எனில் அந்த எண்கள் யாவை?

(i) வாக்கியக் கணக்கினை ஆராய்தல்

1. அடுத்தடுத்த இரு இயல்எண்கள் $x, x+1$ என்க.
2. இரு இயல்எண்ணகளின் கூடுதல் 75.
3. இரு எண்களையும் காணவேண்டும்.

(ii) வாக்கியக் கணக்கினை கணிதக் குறியீடுகளாக மாற்றுதல்

$$x + x + 1 = 75$$

(iii) கணக்கிற்கு தீர்வு காணுதல்

$$x + x + 1 = 75$$
$$2x + 1 = 75$$
$$2x = 75 - 1$$
$$2x = 74$$
$$x = \frac{74}{2}$$
$$x = 37$$

முதல் எண் $x = 37$

இரண்டாம் எண் $x + 1 = 38$

(ii) **தீர்வினை மீளாய்வு செய்தல்**

$$2x + 1 = 75$$
$$2(37) + 1 = 75$$
$$74 + 1 = 75$$
$$75 = 75$$

9. இரு அடுத்தடுத்த மிகை ஒற்றை முழுக்களின் கூடுதல் 32 எனில் அவ்வெண்களைக் காண்க.

(i) **வாக்கியக் கணக்கினை ஆராய்தல்**

1. அடுத்தடுத்த இரு மிகை ஒற்றை முழுக்கள் $x, x + 2$ என்க.
2. இரு இயல்எண்ணகளின் கூடுதல் 32.
3. இரு எண்களையும் காணவேண்டும்.

(ii) **வாக்கியக் கணக்கினை கணிதக் குறியீடுகளாக மாற்றுதல்**

$$x + x + 2 = 32$$

(iv) **கணக்கிற்கு தீர்வு காணுதல்**

$$x + x + 2 = 32$$
$$2x + 2 = 32$$
$$2x = 32 - 2$$
$$2x = 30$$
$$x = \frac{30}{2}$$
$$x = 15$$

முதல் எண் $x = 15$

இரண்டாம் எண் $x + 1 = 17$

(iii) **தீர்வினை மீளாய்வு செய்தல்**

$$2x + 2 = 32$$
$$2(15) + 2 = 32$$
$$30 + 2 = 32$$
$$32 = 32$$

10. ஒரு செவ்வக வடிவ நிலத்தின் நீளமானது அகலத்தை விட 9 மீ அதிகம். மேலும் அச்செவ்வக வடிவ நிலத்தின் சுற்றளவு 154 மீ எனில், நிலத்தின் நீளம், அகலங்களைக் காண்க.

(i) வாக்கியக் கணக்கினை ஆராய்தல்

கொடுக்கப்பட்டது : 1. செவ்வக வடிவ நிலத்தின் **நீளமானது அகலத்தை விட 9 மீ அதிகம்.**

2. செவ்வக வடிவ நிலத்தின் சுற்றளவு 154 மீ

கேட்கப்பட்டது: 1. நிலத்தின் **நீளம், அகலங்களைக் காண்க.**

(ii) கணித குறியீடாகவோ அல்லது படமாகவோ மாற்றுதல்

செவ்வக வடிவ நிலத்தின் அகலம் x மீ என்க.

நீளம் x + 9 மீ என்க

செவ்வக வடிவ நிலத்தின் சுற்றளவு 154 மீ

2 (நீளம் + அகலம்) = 154

(iii) கணக்கிற்கு தீர்வு காணுதல்

செவ்வக வடிவ நிலத்தின் சுற்றளவு 2(நீளம்+அகலம்) = 154

$$2(x + 9 + x) = 154$$
$$2(2x + 9) = 154$$
$$4x + 18 = 154$$
$$4x = 154 - 18$$
$$x = \frac{136}{4}$$
$$x = 34$$

செவ்வக வடிவ நிலத்தின் அகலம் = 34 மீ

செவ்வக வடிவ நிலத்தின் நீளம் = 44+9 = 43 மீ

(iv) தீர்வினை மீளாய்வு செய்தல்

செவ்வக வடிவ நிலத்தின் சுற்றளவு 2(நீளம்+அகலம்) = 154

2(43+34)=154

2(77)=154

154=154

11. ஒரு செவ்வகத்தின் நீளமானது அதன் அகலத்தில் மூன்றில் ஒரு பங்கு ஆகும். அச்செவ்வகத்தின் சுற்றளவு 64மீ எனில், செவ்வகத்தின் நீளம், அகலம் காண்க.

(i) வாக்கியக் கணக்கினை ஆராய்தல்

கொடுக்கப்பட்டது : 1. செவ்வகத்தின் நீளமானது அதன் அகலத்தில் மூன்றில் ஒரு பங்கு.

2. அச்செவ்வகத்தின் சுற்றளவு 64மீ

கேட்கப்பட்டது: 1. செவ்வகத்தின் **நீளம், அகலங்களைக் காண்க.**

(ii) கணித குறியீடாகவோ அல்லது படமாகவோ மாற்றுதல்

செவ்வகத்தின் அகலம் x மீ என்க

செவ்வகத்தின் நீளம் $\frac{1}{3}x$ மீ என்க

செவ்வகத்தின் சுற்றளவு 2 (நீளம் + அகலம்)= 64 மீ

(iii) கணக்கிற்கு தீர்வு காணுதல்

செவ்வகத்தின் சுற்றளவு 2 (நீளம் + அகலம்)= 64 மீ

$$2(x + \frac{x}{3}) = 64$$
$$2(3x + x) = 64 \times 3$$
$$2(4x) = 192$$
$$4x = 96$$
$$x = \frac{96}{4}$$
$$x = 24$$

செவ்வகத்தின் அகலம் x = 24 மீ

செவ்வகத்தின் நீளம் $\frac{1}{3}x = \frac{24}{3}$ = 8 மீ

(iv) **தீர்வினை மீளாய்வு செய்தல்**

செவ்வகத்தின் சுற்றளவு 2 (நீளம் + அகலம்)= 64 மீ

$$2(8 + 24) = 64$$
$$2(32) = 64$$
$$64 = 64$$

12. ஒரு செவ்வக வடிவ பாத்திரத்தின் நீளமானது அகலத்தை விட 7செ.மீ அதிகம். மேலும் அச்செவ்வக வடிவ பாத்திரத்தின் சுற்றளவு 162 செ.மீ எனில் அப்பாத்திரத்தின் நீள, அகலங்களைக் காண்க.

(i) **வாக்கியக் கணக்கினை ஆராய்தல்**

கொடுக்கப்பட்டது : 1. செவ்வக வடிவ பாத்திரத்தின் நீளமானது அகலத்தை விட 7செ.மீ அதிகம்

2. அச்செவ்வக வடிவ பாத்திரத்தின் சுற்றளவு 162 செ.மீ

கேட்கப்பட்டது: 1. **அப்பாத்திரத்தின் நீளம், அகலங்களைக் காண்க.**

(ii) **கணித குறியீடாகவோ அல்லது படமாகவோ மாற்றுதல்**

செவ்வக வடிவ **பாத்திரத்தின்** அகலம் x **செ.மீ** என்க.

நீளம் x + 7 **செ.மீ** என்க

செவ்வக வடிவ **பாத்திரத்தின்** சுற்றளவு 162 **செ.மீ**

2 (நீளம் + அகலம்) = 162

(iii) கணக்கிற்கு தீர்வு காணுதல்

2 (நீளம் + அகலம்) = 162

$$2(x+7+x)=162$$
$$2(2x+7)=162$$
$$4x+14=162$$
$$4x=162-14$$
$$4x=148$$
$$x=\frac{148}{4}$$
$$x=37$$

செவ்வக வடிவ **பாத்திரத்தின்** அகலம் x = 37 **செ.மீ**

நீளம் (x + 7)= 37+7 = 44 **செ.மீ**

(iv) ***தீர்வினை மீளாய்வு செய்தல்***

2 (நீளம் + அகலம்) = 162

2(44+37)=162

2(81)=162

162=162

13. ஒரு பின்னத்தின் பகுதியானது அதன் தொகுதியைவிட 3 அதிகம். அப்பின்னத்தின் தொகுதியுடன் 2 யையும், பகுதியுடன் 9 யையும் கூட்ட பின்னமானது 5/6 என மாறுகிறது எனில், முதலில் எடுத்துக்கொண்ட உண்மையான பின்னம் யாது.

(i) வாக்கியக் கணக்கினை ஆராய்தல்

கொடுக்கப்பட்டது : 1. பின்னத்தின் பகுதியானது அதன் தொகுதியைவிட 3 அதிகம்.

2. அப்பின்னத்தின் தொகுதியுடன் 2 யையும், பகுதியுடன் 9 யையும் கூட்ட பின்னமானது 5/6 என மாறுகிறது

கேட்கப்பட்டது: 1. முதலில் எடுத்துக்கொண்ட உண்மையான பின்னம் **காண்க.**

(ii) கணித குறியீடாகவோ அல்லது படமாகவோ மாற்றுதல்

முதலில் எடுத்துக்கொண்ட உண்மையான பின்னம் = $\frac{x}{y}$ என்க.

பின்னத்தின் தொகுதி x என்க .

பகுதி y = தொகுதி + 3

y = x +3

அந்த பின்னம் $\frac{x}{y} = \frac{x}{x+3}$ என எழுதலாம்.

கணக்கீட்டின் படி $\frac{x+2}{(x+3)+9} = \frac{5}{6}$

(iii) கணக்கிற்கு தீர்வு காணுதல்

$$\frac{x+2}{(x+3)+9} = \frac{5}{6}$$
$$6(x+2) = 5(x+3+9)$$
$$6x+12 = 5(x+12)$$
$$6x+12 = 5x+60$$
$$6x-5x = 60-12$$
$$x = 60-12$$
$$x = 48$$

$$y = x+3 = 48+3 = 51$$

முதலில் எடுத்துக்கொண்ட பின்னம் $\frac{x}{y} = \frac{48}{51}$

(iv) **தீர்வினை மீளாய்வு செய்தல்**

$$\frac{x}{y} = \frac{x}{x+3}$$
$$\frac{48}{51} = \frac{48}{48+3}$$
$$\frac{48}{51} = \frac{48}{51}$$

14. **ஒரு பின்னத்தின் பகுதி அதன் தொகுதியை விட 8 அதிகம். அப்பின்னத்தில் தொகுதியின் மதிப்பு 17 அதிகரித்து பகுதியின் மதிப்பு 1 குறைத்தால் 3/2 என்ற பின்னம் கிடைக்கிறது எனில், முதலில் எடுத்துக்கொண்ட உண்மையான பின்னம் என்ன.**

(i) **வாக்கியக் கணக்கினை ஆராய்தல்**

கொடுக்கப்பட்டது : 1. பின்னத்தின் பகுதியானது அதன் தொகுதியைவிட 8 அதிகம்.

2. அப்பின்னத்தில் தொகுதியின் மதிப்பு 17 அதிகரித்து பகுதியின் மதிப்பு 1 குறைத்தால் 3/2.

கேட்கப்பட்டது: 1. முதலில் எடுத்துக்கொண்ட உண்மையான பின்னம் **காண்க.**

(ii) **கணித குறியீடாகவோ அல்லது படமாகவோ மாற்றுதல்**

முதலில் எடுத்துக்கொண்ட உண்மையான பின்னம் = $\frac{x}{y}$ என்க.

பின்னத்தின் தொகுதி x என்க .

பகுதி y = தொகுதி + 8

y = x +8

அந்த பின்னம் $\frac{x}{y} = \frac{x}{x+8}$ என எழுதலாம்.

கணக்கீட்டின் படி $\frac{x+17}{(x+8)-1} = \frac{3}{2}$

(iii) கணக்கிற்கு தீர்வு காணுதல்

$$\frac{x+17}{(x+8)-1} = \frac{3}{2}$$

$$\frac{x+17}{x+7} = \frac{3}{2}$$
$$2x + 34 = 3x + 21$$
$$-x = -13$$
$$x = 13$$

$$y = x+8 = 13+8 = 21$$

முதலில் எடுத்துக்கொண்ட பின்னம் $\frac{x}{y} = \frac{13}{21}$

(iv) **தீர்வினை மீளாய்வு செய்தல்**

$$\frac{x}{y} = \frac{x}{x+8}$$
$$\frac{13}{21} = \frac{13}{13+8}$$
$$\frac{13}{21} = \frac{13}{21}$$

15. ஒரு பின்னத்தின் பகுதி அதன் தொகுதியை விட 2 அதிகம். மேலும் அப்பின்னத்தின் தொகுதியுடன், பகுதியுடனும் ஒன்றைக் கூட்டினால் $\frac{2}{3}$ **கிடைக்கும் எனில் அந்த பின்ன எண்ணைக் காண்க.**

(i) வாக்கியக் கணக்கினை ஆராய்தல்

கொடுக்கப்பட்டது : 1. பின்னத்தின் பகுதியானது அதன் தொகுதியைவிட 2 அதிகம்.

2. அப்பின்னத்தில் **அப்பின்னத்தின் தொகுதியுடன், பகுதியுடனும் ஒன்றைக் கூட்டினால்** $\frac{2}{3}$.

கேட்கப்பட்டது: 1. முதலில் எடுத்துக்கொண்ட உண்மையான பின்னம் **காண்க.**

(ii) வாக்கியக் கணக்கினை கணிதக் குறியீடுகளாக மாற்றுதல்

முதலில் எடுத்துக்கொண்ட உண்மையான பின்னம் = $\frac{x}{y}$ என்க.

பின்னத்தின் தொகுதி x என்க .

பகுதி y = தொகுதி + 2

y = x +2

அந்த பின்னம் $\frac{x}{y} = \frac{x}{x+2}$ என எழுதலாம்.

கணக்கீட்டின் படி

$$\frac{x+1}{x+3} = \frac{2}{3}$$

(iii) கணக்கிற்கு தீர்வு காணுதல்

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

$$y = x+2 = 3+2 = 5$$

முதலில் எடுத்துக்கொண்ட பின்னம் $\frac{x}{y} = \frac{3}{5}$

(iii) **தீர்வினை மீளாய்வு செய்தல்**

$$\frac{x+1}{x+3}=\frac{2}{3}$$

$$\frac{3+1}{3+3}=\frac{2}{3}$$

$$\frac{4}{6}=\frac{2}{3}$$

$$\frac{2}{3}=\frac{2}{3}$$

16. ஓர் ஈரிலக்க எண்ணின் இலக்கங்களின் கூடுதல் 9. அந்த எண்ணில் இருந்து 27 ஐக் கழித்தால் இலக்கங்கள் இடம் மாறிய எண் கிடைக்கும். எனில் அந்த எண்ணைக் காண்க.

(i) **வாக்கியக் கணக்கினை ஆராய்தல்**

கொடுக்கப்பட்ட கணக்கினை பலமுறை வாசிக்க வேண்டும். அதன் பின் கணக்கில் கொடுக்கப்பட்டதையும், கேட்கப்பட்டத்தையும் ஆராயவேண்டும்.

கொடுக்கப்பட்டது`:

1. ஈரிலக்க எண்ணின் இலக்கங்களின் கூடுதல் 9.
2. ஈரிலக்க எண்ணில் இருந்து 27 ஐக் கழித்தால் இலக்கங்கள் இடம் மாறிய எண் கிடைக்கும்.

கேட்கப்பட்டது

1. ஈரிலக்க எண் காணவேண்டும்.

(ii) **கணிதக் குறியீடாகவோ அல்லது படமாகவோ மாற்றுதல்**

ஓர் ஈரிலக்க எண்ணின் பத்தாம் இலக்கம் x என்க.

ஒன்றாம் இலக்கம் y என்க.

ஈரிலக்க எண் $10x+y$ என்க.

இலக்கங்களின் கூடுதல் 9.

$x + y = 9$ ----------(1)

ஈரிலக்க எண்ணில் இருந்து 27 ஐக் கழித்தால் இலக்கங்கள் இடம் மாறிய எண் கிடைக்கும்

அதாவது ,

$10x + y - 27 = 10y + x$

$10x + y - 27 = 10y + x$

$10x - x + y - 10y = 27$

$9x - 9y = 27$

$x - y = 3$

$x = y + 3 - (2)$

(iii) கணக்கிற்கு தீர்வு காணுதல்

சமன்பாடு 2-ன் மதிப்பை சமன்பாடு 1-ல் பிரதியிட

$x + y = 9$

$(y + 3) + y = 9$

$2y = 9 - 3$

$2y = 6$

$y = 3$

$x = y + 3$

$x = 3 + 3$

$x = 6$

ஈரிலக்க எண் $10x + y$ =10(6)+3

=60+3

=63

(iv) தீர்வினை மீளாய்வு செய்தல்

x, y -ன் மதிப்புகளை சமன்பாடு 1-ல் பிரதியிட

$x + y = 9$

$6 + 3 = 9$

$9 = 9$

விடை சரிபார்க்கப்பட்டது.

17. ஓர் ஈரிலக்க எண்ணின் இலக்கங்களின் கூடுதல் 8. அந்த எண்ணில் இருந்து 18 ஐ கூட்டினால் இலக்கங்கள் இடம் மாறிய எண் கிடைக்கும். எனில் அந்த எண்ணைக் காண்க.

(i) வாக்கியக் கணக்கினை ஆராய்தல்

கொடுக்கப்பட்ட கணக்கினை பலமுறை வாசிக்க வேண்டும். அதன் பின் கணக்கில் கொடுக்கப்பட்டதையும், கேட்கப்பட்டத்தையும் ஆராயவேண்டும்.

கொடுக்கப்பட்டது`:

1. ஈரிலக்க எண்ணின் இலக்கங்களின் கூடுதல் 8.
2. ஈரிலக்க எண்ணில் இருந்து 18 ஐக் **கூட்டினால்** இலக்கங்கள் இடம் மாறிய எண் கிடைக்கும்.

கேட்கப்பட்டது:

1. ஈரிலக்க எண் காணவேண்டும்.

(ii) கணிதக் குறியீடாகவோ அல்லது படமாகவோ மாற்றுதல்

ஓர் ஈரிலக்க எண்ணின் பத்தாம் இலக்கம் x என்க.

ஒன்றாம் இலக்கம் y என்க.

ஈரிலக்க எண் $10x+y$ என்க.

இலக்கங்களின் கூடுதல் 8.

$x+y=8$ ----------(1)

ஈரிலக்க எண்ணில் 18 ஐக் **கூட்டினால்** இலக்கங்கள் இடம் மாறிய எண் கிடைக்கும்

அதாவது ,

$10x + y + 18 = 10y + x$

$10x + y - 10y - x = -18$

$9x - 9y = -18$

$x - y = -2$

$x = y - 2 - (2)$

(iii) கணக்கிற்கு தீர்வு காணுதல்

சமன்பாடு 2-ன் மதிப்பை சமன்பாடு 1-ல் பிரதியிட

$x + y = 8$

$(y - 2) + y = 8$

$2y = 8 + 2$

$2y = 10$

$y = 5$

$x = y - 2$

$x = 5 - 2$

$x = 3$

ஈரிலக்க எண் $10x + y$ =10(3)+5

=30+5

=35

(iv) **தீர்வினை மீளாய்வு செய்தல்**

x, y -ன் மதிப்புகளை சமன்பாடு 1-ல் பிரதியிட

$x + y = 8$

$3 + 5 = 8$

$8 = 8$

விடை சரிபார்க்கப்பட்டது.

18. ஓர் ஈரிலக்க எண்ணின் இலக்கங்களின் கூடுதல் 10. அந்த எண்ணில் இருந்து 18 ஐக் கழித்தால் இலக்கங்கள் இடம் மாறிய எண் கிடைக்கும். எனில் அந்த எண்ணைக் காண்க.

(i) வாக்கியக் கணக்கினை ஆராய்தல்

கொடுக்கப்பட்ட கணக்கினை பலமுறை வாசிக்க வேண்டும். அதன் பின் கணக்கில் கொடுக்கப்பட்டதையும், கேட்கப்பட்டத்தையும் ஆராயவேண்டும்.

கொடுக்கப்பட்டது:

1. ஈரிலக்க எண்ணின் இலக்கங்களின் கூடுதல் 10.
2. ஈரிலக்க எண்ணில் இருந்து 18 ஐக் **கழித்தால்** இலக்கங்கள் இடம் மாறிய எண் கிடைக்கும்.

கேட்கப்பட்டது:

ஈரிலக்க எண் காணவேண்டும்

(ii) கணிதக் குறியீடாகவோ அல்லது படமாகவோ மாற்றுதல்

ஓர் ஈரிலக்க எண்ணின் பத்தாம் இலக்கம் x என்க.

ஒன்றாம் இலக்கம் y என்க.

ஈரிலக்க எண் $10x+y$ என்க.

இலக்கங்களின் கூடுதல் 10.

$x+y=10$----------(1)

ஈரிலக்க எண்ணில் இருந்து 18 ஐக் கழித்தால் இலக்கங்கள் இடம் மாறிய எண் கிடைக்கும்

அதாவது ,

$10x+y-18=10y+x$

$10x-x+y-10y=18$

$9x-9y=18$

$x-y=2$ -

$x=y+2$ ----------(2)

(iii) கணக்கிற்கு தீர்வு காணுதல்

சமன்பாடு 2-ன் மதிப்பை சமன்பாடு 1-ல் பிரதியிட

$x + y = 10$

$(y + 2) + y = 10$

$2y + 2 = 10$

$2y = 10 - 2$

$2y = 8$

$y = 4$

y-ன் மதிப்பை சமன்பாடு 2-ல் பிரதியிட

$x = y + 2$

$x = 4 + 2$

$x = 6$

ஈரிலக்க எண் $10x + y$ = 10(6) + 4 = 60 + 4= 64

ஈரிலக்க எண் = 64

(iv) **தீர்வினை மீளாய்வு செய்தல்**

x, y -ன் மதிப்புகளை சமன்பாடு 1-ல் பிரதியிட

$x + y = 10$

6 + 4 = 10

10 = 10

விடை சரிபார்க்கப்பட்டது.

19`. ஓர் அம்மா தன்னுடைய மகளின் வயதினைப்போல் 5 மடங்கு வயதில் பெரியவர். இரண்டு ஆண்டுகளுக்கு பின், அம்மாவின் வயது மகளின் வயதைப்போல் நான்கு மடங்கு எனில், அவர்களின் தற்போதைய வயது என்ன.

(i) **வாக்கியக் கணக்கினை ஆராய்தல்**

கொடுக்கப்பட்டது:

1. அம்மா தன்னுடைய மகளின் வயதினைப்போல் 5 மடங்கு.

2. இரண்டு ஆண்டுகளுக்கு பின், அம்மாவின் வயது மகளின் வயதைப்போல் நான்கு மடங்கு

கேட்கப்பட்டது:

1. அவர்களின் தற்போதைய வயது

(ii) கணிதக் குறியீடாகவோ அல்லது படமாகவோ மாற்றுதல்

மகளின் தற்போதைய வயது x என்க.

அம்மாவின் தற்போதைய வயது $5x$ என்க.

இரண்டு ஆண்டுகளுக்கு பிறகு

மகளின் வயது $x+2$ என்க.

அம்மாவின் வயது $5x+2$ என்க.

இரண்டு ஆண்டுகளுக்கு பின், அம்மாவின் வயது மகளின் வயதைப்போல் நான்கு மடங்கு

$$4(x+2)=5x+2$$

(iii). கணக்கிற்கு தீர்வு காணுதல்

கணக்கீட்டின் படி

$$4(x+2)=5x+2$$
$$4x+8=5x+2$$
$$8-2=5x-4x$$
$$6=x$$
$$x=6$$

மகளின் தற்போதைய வயது $x = 6$

அம்மாவின் தற்போதைய வயது $5x = 5(6)=30$.

(iv). தீர்வினை மீளாய்வு செய்தல்

அம்மாவின் வயது =30.

அம்மாவின் வயது =5(6)

அம்மாவின் வயது =5(மகளின் வயது)

அம்மா தன்னுடைய மகளின் வயதினைப்போல் 5 மடங்கு.

விடை சரிபார்க்கப்பட்டது.

20. **தாய், மகன் இருவரின் வயதுகளின் கூடுதல் 46. பத்து ஆண்டுகளுக்கு பின்னர் தாயின் வயது மகனின் வயதைப்போல் இரண்டு மடங்கு எனில் அவர்களின் தற்போதைய வயதினைக் காண்க.**

(i) **வாக்கியக் கணக்கினை ஆராய்தல்**

கொடுக்கப்பட்டது:

1.**தாய், மகன் இருவரின் வயதுகளின் கூடுதல்** 46

2.**பத்து ஆண்டுகளுக்கு பின்னர் தாயின் வயது மகனின் வயதைப்போல் இரண்டு மடங்கு**

கேட்கப்பட்டது:

1. **தாய், மகன் தற்போதைய வயதினைக் காண்க.**

(ii) **கணித குறியீடாகவோ அல்லது படமாகவோ மாற்றுதல்**

1. தற்போதைய தாய் வயதினை x என்க.
2. தற்போதைய மகனின் வயதினை y என்க.
3. **இருவரின் வயதுகளின் கூடுதல் = 46**

$x+y=46$----------(1)

பத்து ஆண்டுகளுக்கு பின்னர் ,

தாயின் வயது $x+10$

மகனின் வயது $y+10$

பத்து ஆண்டுகளுக்கு பின்னர் தாயின் வயது மகனின் வயதைப்போல் இரண்டு மடங்கு

$x+10 = 2(y+10)$

$x+10 = 2y+20$

$x = 2y+20-10$

$x = 2y+10$ ----------(2).

(iii) **கணக்கிற்கு தீர்வு காணுதல்**

சமன்பாடு 2 யை 1 ல் பிரதியிட

$x+y=46$

$2y+10+y=46$

$3y=46-10$

$3y=36$

$y=12$

y=12 **யை** சமன்பாடு 1-ல் பிரதியிட

$x+12=46$

$x=46-12$

$x=34$

தாயின் தற்போதைய வயது $x=34$

மகனின் தற்போதைய வயது $y=12$

(iv) **தீர்வினை மீளாய்வு செய்தல்**

x, y -ன் மதிப்புகளை சமன்பாடு 1-ல் பிரதியிட

$x+y=46$

34 + 12 = 46

46=46

விடை சரிபார்க்கப்பட்டது.

21. இராஜன் தன் வீட்டில் இருந்து இரு சக்கர வாகனத்தில் மணிக்கு 35 கி.மீ வேகத்தில் சென்று தன்னுடைய அலுவலகத்தை 5 நிமிடம் தாமதமாக சென்றடைகிறார். அவர் மணிக்கு 50 கி.மீ வேகத்தில் சென்றிருந்தால் அலுவலகத்தை 4 நிமிடம் முன்னதாகவே சென்றடைந்திருப்பார் எனில் அவருடைய அலுவலகம், வீட்டிலிருந்து எவ்வளவு தூரத்தில் உள்ளது.

(i). வாக்கியக் கணக்கினை ஆராய்தல்

கொடுக்கப்பட்டது:

1. இராஜன் மணிக்கு 35 கி.மீ வேகத்தில் சென்று தன்னுடைய அலுவலகத்தை 5 நிமிடம் தாமதமாக சென்றடைகிறார்.

2. மணிக்கு 50 கி.மீ வேகத்தில் சென்றிருந்தால் அலுவலகத்தை 4 நிமிடம் முன்னதாகவே சென்றடைந்திருப்பார்.

கேட்கப்பட்டது:

1. அவருடைய அலுவலகம், வீட்டிலிருந்து எவ்வளவு தூரம் என காண வேண்டும்.

(ii). வாக்கியக் கணக்கினை கணிதக் குறியீடுகளாக மாற்றுதல்

1. வீட்டிற்கும் அலுவலகத்திற்கும் இடையே உள்ள தூரம் = x கி.மீ என்க.

2. நேரம் T = தூரம் /வேகம்

3. x கி.மீ தூரத்தை 35 கி.மீ/மணி என்ற வேகத்தில் கடக்க ஆகும் நேரம் $T_1 = \frac{x}{35}$ மணி

4. x கி.மீ தூரத்தை 50 கி.மீ/மணி என்ற வேகத்தில் கடக்க ஆகும் நேரம் $T_2 = \frac{x}{50}$ மணி

5. இரண்டு நேரங்களுக்கு இடையே உள்ள வேறுபாடு = 4-(-5)

= 4+5= 9 நிமிடம்

$= \frac{9}{60}$ மணி

அதாவது

$$T_1 - T_2 = \frac{9}{60}$$

(iii) கணக்கிற்கு தீர்வு காணுதல்

$$T_1 - T_2 = \frac{9}{60}$$

$$\frac{x}{35} - \frac{x}{50} = \frac{9}{60}$$

$$\frac{x}{7} - \frac{x}{10} = \frac{9}{60}$$

$$\frac{10x - 7x}{70} = \frac{9}{12}$$

$$3x = \frac{9}{12} \times 70$$

$$x = 17\frac{1}{2} k.m$$

வீட்டிற்கும் அலுவலகத்திற்கும் இடையே உள்ள தூரம் = $17\frac{1}{2}$ கி.மீ

22. ஒரு தொடர்வண்டி மணிக்கு 60 கி.மீ வேகத்தில் சென்றால் சேரவேண்டிய இடத்திற்கு 15 நிமிடங்கள் தாமதமாக சென்று சேரும். ஆனால் அவ்வண்டி மணிக்கு 85 கி.மீ வீக்கத்தில் சென்றால் சேரவேண்டிய இடத்திற்கு 4 நிமிடங்கள் மட்டுமே தாமதமாக சென்று சேரும் எனில் தொடர்வண்டி கடக்க வேண்டிய தூரம் காண்க.

(i). வாக்கியக் கணக்கினை ஆராய்தல்

கொடுக்கப்பட்டது:

1. ஒரு தொடர்வண்டி மணிக்கு 60 கி.மீ வேகத்தில் சென்றால் சேரவேண்டிய இடத்திற்கு 15 நிமிடங்கள் தாமதமாக சென்று சேரும.

2. அவ்வண்டி மணிக்கு 85 கி.மீ வீக்கத்தில் சென்றால் சேரவேண்டிய இடத்திற்கு 4 நிமிடங்கள் மட்டுமே தாமதமாக சென்று சேரும்.

கேட்கப்பட்டது: 1. தொடர்வண்டி கடக்க வேண்டிய தூரம் காண்க.

(ii). வாக்கியக் கணக்கினை கணிதக் குறியீடுகளாக மாற்றுதல்

1. தொடர்வண்டி கடக்க வேண்டிய தூரம் = x கி.மீ என்க.

2. நேரம் T = தூரம் /வேகம்

3. x கி.மீ தூரத்தை 60 கி.மீ/மணி என்ற வேகத்தில் கடக்க ஆகும் நேரம் $T_1 = \frac{x}{60}$ மணி

4. x கி.மீ தூரத்தை 85 கி.மீ/மணி என்ற வேகத்தில் கடக்க ஆகும் நேரம் $T_2 = \frac{x}{85}$ மணி

5. இரண்டு நேரங்களுக்கு இடையே உள்ள வேறுபாடு = 15-4

= 11 நிமிடம்

= $\frac{11}{60}$ மணி

அதாவது

$$T_1 - T_2 = \frac{11}{60}$$

(iii). **கணக்கிற்கு தீர்வு காணுதல்**

$$T_1 - T_2 = \frac{11}{60}$$
$$\frac{x}{60} - \frac{x}{85} = \frac{11}{60}$$
$$\frac{x}{12} - \frac{x}{17} = \frac{11}{12}$$
$$\frac{17x - 12x}{204} = \frac{11}{12}$$
$$5x = 204 \times \frac{11}{12}$$
$$x = \frac{204 \times 11}{5 \times 12}$$
$$x = 37.4k.m$$

தொடர்வண்டி கடக்க வேண்டிய தூரம் = 37.4 கி.மீ

APPENDIX-VI

WORK SHEET

கற்றல் தாள்

1. இரண்டு எண்களின் கூடுதல் 36. மேலும் அவற்றில் ஓர் எண் மற்றோர் எண்ணை விட 8 அதிகம் எனில், அந்த எண்களைக் காண்க.

   (i) வாக்கியக் கணக்கினை ஆராய்தல்

   (ii) கணித குறியீடாகவோ அல்லது படமாகவோ மாற்றுதல்:

   (iii) கணக்கிற்கு தீர்வு காணுதல்:

   (iv) தீர்வினை மீளாய்வு செய்தல்:

2. ஓர் எண் மற்றோர் எண்ணின் 7 மடங்கு ஆகும். அவற்றின் வித்தியாசம் 18 எனில் அவ்வெண்களைக் காண்க.

   (i) வாக்கியக் கணக்கினை ஆராய்தல்

(ii) கணித குறியீடாகவோ அல்லது படமாகவோ மாற்றுதல்:

(iii) கணக்கிற்கு தீர்வு காணுதல்:

(iv) தீர்வினை மீளாய்வு செய்தல்:

3. ஓர் மரத்துண்டின் நீளம் 2மீ ஆகும். அம்மரத்துண்டினை ஒரு தட்சர் இரண்டு துண்டுகளாக, அதாவது முதல் துண்டின் அளவானது இரண்டாம் துண்டின் அளவின் இரு மடக்கில் இருந்து 40 செ.மீ குறைவாக வருமாறு வெட்டநினைத்தார் எனில் சிறிய துண்டின் நீளம் எவ்வளவு.

(i) வாக்கியக் கணக்கினை ஆராய்தல்

(ii) கணித குறியீடாகவோ அல்லது படமாகவோ மாற்றுதல்

(iii) கணக்கிற்கு தீர்வு காணுதல்:

(iv) தீர்வினை மீளாய்வு செய்தல்:

4. அடுத்தடுத்த மூன்று ஒற்றை எண்களின் கூடுதல் 75 எனில்,அவற்றுள் எது பெரிய எண்.

(i) வாக்கியக் கணக்கினை ஆராய்தல்

(ii) கணித குறியீடாகவோ அல்லது படமாகவோ மாற்றுதல்

(iii) கணக்கிற்கு தீர்வு காணுதல்:

(iv) தீர்வினை மீளாய்வு செய்தல்:

6. அடுத்தடுத்து வரும் மூன்று முழுக்களின் கூடுதல் 45. அந்த முழுக்களைக் காண்க.

(i) வாக்கியக் கணக்கினை ஆராய்தல்

(ii)` வாக்கியக் கணக்கினை கணிதக் குறியீடுகளாக மாற்றுதல்

(ii) கணக்கிற்கு தீர்வு காணுதல்

(iii) தீர்வினை மீளாய்வு செய்தல்

7. அடுத்தடுத்த மூன்று எண்களின் கூடுதல் 90. அவ்வெண்களைக் காண்க.

(i) வாக்கியக் கணக்கினை ஆராய்தல்

(ii) வாக்கியக் கணக்கினை கணிதக் குறியீடுகளாக மாற்றுதல்

(iii)கணக்கிற்கு தீர்வு காணுதல்

(iv) தீர்வினை மீளாய்வு செய்தல்

8. அடுத்தடுத்து வரும் இரு இயல் எண்களின் கூடுதல் 75 எனில் அந்த எண்கள் யாவை?

(i) வாக்கியக் கணக்கினை ஆராய்தல்

.

(ii) வாக்கியக் கணக்கினை கணிதக் குறியீடுகளாக மாற்றுதல்

(iii) கணக்கிற்கு தீர்வு காணுதல்

(ii) தீர்வினை மீளாய்வு செய்தல்

9. இரு அடுத்தடுத்த மிகை ஒற்றை முழுக்களின் கூடுதல் 32 எனில் அவ்வெண்களைக் காண்க.

(i) வாக்கியக் கணக்கினை ஆராய்தல்

(ii) வாக்கியக் கணக்கினை கணிதக் குறியீடுகளாக மாற்றுதல்

(iii)கணக்கிற்கு தீர்வு காணுதல்

(iii) தீர்வினை மீளாய்வு செய்தல்

10. ஒரு செவ்வக வடிவ நிலத்தின் நீளமானது அகலத்தை விட 9 மீ அதிகம். மேலும் அச்செவ்வக வடிவ நிலத்தின் சுற்றளவு 154 மீ எனில், நிலத்தின் நீளம், அகலங்களைக் காண்க.

(i) வாக்கியக் கணக்கினை ஆராய்தல்

(ii) கணித குறியீடாகவோ அல்லது படமாகவோ மாற்றுதல்

(iii) கணக்கிற்கு தீர்வு காணுதல்

(iv) தீர்வினை மீளாய்வு செய்தல்

11. ஒரு செவ்வகத்தின் நீளமானது அதன் அகலத்தில் மூன்றில் ஒரு பங்கு ஆகும். அச்செவ்வகத்தின் சுற்றளவு 64மீ எனில், செவ்வகத்தின் நீளம், அகலம் காண்க.

(i) வாக்கியக் கணக்கினை ஆராய்தல்

(ii) கணித குறியீடாகவோ அல்லது படமாகவோ மாற்றுதல்

(iii) கணக்கிற்கு தீர்வு காணுதல்

(iv) தீர்வினை மீளாய்வு செய்தல்

12. ஒரு செவ்வக வடிவ பாத்திரத்தின் நீளமானது அகலத்தை விட 7செ.மீ அதிகம். மேலும் அச்செவ்வக வடிவ பாத்திரத்தின் சுற்றளவு 162 செ.மீ எனில் அப்பாத்திரத்தின் நீள, அகலங்களைக் காண்க.

(i) வாக்கியக் கணக்கினை ஆராய்தல்

(ii) கணித குறியீடாகவோ அல்லது படமாகவோ மாற்றுதல்

(iii) கணக்கிற்கு தீர்வு காணுதல்

(iv) தீர்வினை மீளாய்வு செய்தல்

13. ஒரு பின்னத்தின் பகுதியானது அதன் தொகுதியைவிட 3 அதிகம். அப்பின்னத்தின் தொகுதியுடன் 2 யையும், பகுதியுடன் 9 யையும் கூட்ட பின்னமானது 5/6 என மாறுகிறது எனில், முதலில் எடுத்துக்கொண்ட உண்மையான பின்னம் யாது.

(i) வாக்கியக் கணக்கினை ஆராய்தல்

(ii). கணித குறியீடாகவோ அல்லது படமாகவோ மாற்றுதல்

(iii)கணக்கிற்கு தீர்வு காணுதல்

(iv)தீர்வினை மீளாய்வு செய்தல்

14. ஒரு பின்னத்தின் பகுதி அதன் தொகுதியை விட 8 அதிகம். அப்பின்னத்தில் தொகுதியின் மதிப்பு 17 அதிகரித்து பகுதியின் மதிப்பு 1 குறைத்தால் 3/2 என்ற பின்னம் கிடைக்கிறது எனில், முதலில் எடுத்துக்கொண்ட உண்மையான பின்னம் என்ன.

(i) வாக்கியக் கணக்கினை ஆராய்தல்

(ii) கணித குறியீடாகவோ அல்லது படமாகவோ மாற்றுதல்

(iii) கணக்கிற்கு தீர்வு காணுதல்

(iv) தீர்வினை மீளாய்வு செய்தல்

15. ஒரு பின்னத்தின் பகுதி அதன் தொகுதியை விட 2 அதிகம். மேலும் அப்பின்னத்தின் தொகுதியுடன், பகுதியுடனும் ஒன்றைக் கூட்டினால் $\frac{2}{3}$ கிடைக்கும் எனில் அந்த பின்ன எண்ணைக் காண்க.

(i) வாக்கியக் கணக்கினை ஆராய்தல்

(ii) வாக்கியக் கணக்கினை கணிதக் குறியீடுகளாக மாற்றுதல்

(iii) கணக்கிற்கு தீர்வு காணுதல்

(iv) தீர்வினை மீளாய்வு செய்தல்

16. ஓர் ஈரிலக்க எண்ணின் இலக்கங்களின் கூடுதல் 9. அந்த எண்ணில் இருந்து 27 ஐக் கழித்தால் இலக்கங்கள் இடம் மாறிய எண் கிடைக்கும். எனில் அந்த எண்ணைக் காண்க.

(i) வாக்கியக் கணக்கினை ஆராய்தல்

(ii) கணிதக் குறியீடாகவோ அல்லது படமாகவோ மாற்றுதல்

(iii) கணக்கிற்கு தீர்வு காணுதல்

(iv) தீர்வினை மீளாய்வு செய்தல்

17. ஓர் ஈரிலக்க எண்ணின் இலக்கங்களின் கூடுதல் 8. அந்த எண்ணில் இருந்து 18 ஐ கூட்டினால் இலக்கங்கள் இடம் மாறிய எண் கிடைக்கும். எனில் அந்த எண்ணைக் காண்க.

(i) வாக்கியக் கணக்கினை ஆராய்தல்

(ii) கணிதக் குறியீடாகவோ அல்லது படமாகவோ மாற்றுதல்

(iii) கணக்கிற்கு தீர்வு காணுதல்

(iv) தீர்வினை மீளாய்வு செய்தல்

18. ஓர் ஈரிலக்க எண்ணின் இலக்கங்களின் கூடுதல் 10. அந்த எண்ணில் இருந்து 18 ஐக் கழித்தால் இலக்கங்கள் இடம் மாறிய எண் கிடைக்கும். எனில் அந்த எண்ணைக் காண்க.

(i) வாக்கியக் கணக்கினை ஆராய்தல்

(ii) கணிதக் குறியீடாகவோ அல்லது படமாகவோ மாற்றுதல்

(iii) கணக்கிற்கு தீர்வு காணுதல்

(iv) தீர்வினை மீளாய்வு செய்தல்

19`. ஓர் அம்மா தன்னுடைய மகளின் வயதினைப்போல் 5 மடங்கு வயதில் பெரியவர். இரண்டு ஆண்டுகளுக்கு பின், அம்மாவின் வயது மகளின் வயதைப்போல் நான்கு மடங்கு எனில், அவர்களின் தற்போதைய வயது என்ன.

வாக்கியக் கணக்கினை ஆராய்தல்

(i) கணிதக் குறியீடாகவோ அல்லது படமாகவோ மாற்றுதல்

(iii). கணக்கிற்கு தீர்வு காணுதல்

(iv). தீர்வினை மீளாய்வு செய்தல்

20. தாய், மகன் இருவரின் வயதுகளின் கூடுதல் 46. பத்து ஆண்டுகளுக்கு பின்னர் தாயின் வயது மகனின் வயதைப்போல் இரண்டு மடங்கு எனில் அவர்களின் தற்போதைய வயதினைக் காண்க.

(i) வாக்கியக் கணக்கினை ஆராய்தல்

(ii) கணித குறியீடாகவோ அல்லது படமாகவோ மாற்றுதல்

(iii) கணக்கிற்கு தீர்வு காணுதல்

(iv) தீர்வினை மீளாய்வு செய்தல்

21. இராஜன் தன் வீட்டில் இருந்து இரு சக்கர வாகனத்தில் மணிக்கு 35 கி.மீ வேகத்தில் சென்று தன்னுடைய அலுவலகத்தை 5 நிமிடம் தாமதமாக சென்றடைகிறார். அவர் மணிக்கு 50 கி.மீ வேகத்தில் சென்றிருந்தால் அலுவலகத்தை 4 நிமிடம் முன்னதாகவே சென்றடைந்திருப்பார் எனில் அவருடைய அலுவலகம், வீட்டிலிருந்து எவ்வளவு தூரத்தில் உள்ளது.

(i). வாக்கியக் கணக்கினை ஆராய்தல்

(ii). வாக்கியக் கணக்கினை கணிதக் குறியீடுகளாக மாற்றுதல்

(ii) கணக்கிற்கு தீர்வு காணுதல்

22. ஒரு தொடர்வண்டி மணிக்கு 60 கி.மீ வேகத்தில் சென்றால் சேரவேண்டிய இடத்திற்கு 15 நிமிடங்கள் தாமதமாக சென்று சேரும். ஆனால் அவ்வண்டி மணிக்கு 85 கி.மீ வீக்கத்தில் சென்றால் சேரவேண்டிய இடத்திற்கு 4 நிமிடங்கள் மட்டுமே தாமதமாக சென்று சேரும் எனில் தொடர்வண்டி கடக்க வேண்டிய தூரம் காண்க.

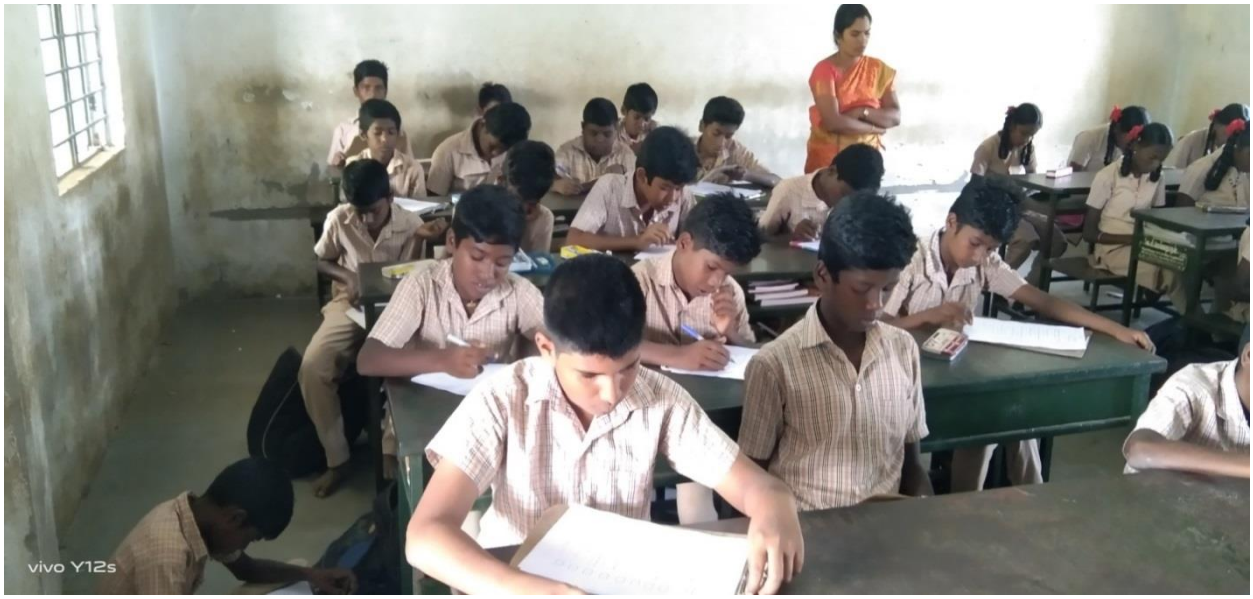
(i). வாக்கியக் கணக்கினை ஆராய்தல்

(ii). வாக்கியக் கணக்கினை கணிதக் குறியீடுகளாக மாற்றுதல்

(iii). **கணக்கிற்கு தீர்வு காணுதல்**

APPENDIX-VII

PILOT STUDY, PRE-TEST AND POST-TEST PHOTOS



1. Pilot study photos

2. Pre-Test Photos

3. Post-Test photos

4. Control group-Traditional method teaching

5. Experimental group teaching method- power point and video lesson