# ENHANCING THE LEARINING CONCEPT OF MENSURATION AMONG UPPER PRIMARY STUDENTS THROUGH INSTRUCTIONAL MATERIALS

***Research project***

**2024**

***By***

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***Submitted to***

State Council of Educational Research and Training Tamilnadu

## Certificate

This is to certify that this project report entitled, "**Enhancing the learning concept of mensuration among upper primary students through instructional materials "** which is to be submitted to the State Council of Educational Research and Training, Chennai-6 is a bonafide work of **M.RAMU, Senior Lecturer SCERT,Chennai district** who has carried out this work under my supervision and guidance. Certified further, that to the best of my knowledge, the work reported herein does not form a part of any other thesis or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other person.

Dr.Usha Rani
Principal
DIET, Tirur

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## ACKNOWLEDGEMENT

Presentation motivation and inspiration have always played a key role in the success of any venture.

I have taken efforts in this project. However, it would not have been possible without the kind support and help of many individuals and other departments. I would like to extend my sincere thanks to all of them.

I am highly indebted to the Director and Joint Directors of SCERT, Chennai for providing me the opportunity to carry out this project.

I feel to acknowledge my indebtedness and deep sense of gratitude to the Experts of research committee, our Principal and project coordinator for their guidance and constant supervision as well as for providing necessary information regarding the project & also for their support in completing the project.

I would like to express my gratitude towards the school Headmasters, Teachers of selected schools of PUMS Nasarathpet, PUMS Varatharajapuram and PUMS Thirumazhisai of Tiruvallur district for their kind co-operation and encouragement which help me in completion of this project.

My thanks to my colleagues throughout the project and people who have willingly helped me out whole heartedly.

## DECLARATION

I, the undersigned solemnly declare that the project report entitled, "**Enhancing the learning concept of mensuration among upper primary students through instructional materials"** submitted to State Council of Educational Research and Training, Chennai- 6 is a record of bonafide work under supervision of Principal, District Institute of Education and Training, Tirur,Thiruvallur district.

I assert the statements made and conclusions drawn are an outcome of my research work. I further certify that the work contained in the report is original and has been done by me. The work has not been submitted to any other Institution for any other degree/diploma/certificate in any other University of India or abroad. I have followed the guidelines provided by the State Council of Educational Research and Training, chennai-6 in writing the report.

Signature of the Researcher

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# CHAPTER I

# INTRODUCTION

# ENHANCING THE LEARNING CONCEPT OF MENSURATIOIN AMONG UPPER PRIMARY STUDENTS THROUGH INSTRUCTIONAL MATERIALS

## CHAPTER I

### 1.0 INTRODUCTION

Mathematics is one of the subjects that were highly addressed in the National Policy of Education by the Ministry of Education. Mathematics is a subject that is taken seriously in the school system because of its importance to the national development, irrespective of country or level of education it has been described as a model of thinking, which encourages learners to observe, reflect and reason logically about a problem and in communicating ideas, making it the central intellectual discipline and a vital tool in science, commerce and technology (Imoko & Agwagah,2006; Iji,2008).Mathematics affords man the opportunity to know and access things and objects within his immediate and remote environment(Kolawole & Oluwatayo,2005). Salman (2005) defines mathematics as a precursor of scientific discoveries and innovations.

In spite of the importance and popularity of mathematics to all aspect of human endeavors, many research findings show that there is increasingly poor achievement in the subject among secondary school students.

### 1.1. MATHEMATICS EDUCATION: CONCEPT

Education lays the foundation block for the growth of science and technology in any country which, in turn, gears up the national development. In the field of education, mathematics education plays a key role since mathematics is of vital importance in all walks of our life. The advent of mathematics dates back to prehistoric period. From the Egyptian papyrus scrolls, the oldest forms of recorded history we learn that as for as back as 4000 B.C. numbers and mathematics were important. The first calendar required a system of numbering, as did recording the movements of celestial bodies. These early people laboriously counted with their fingers. Elementary school children today quickly solve problems with inexpensive hand-held calculators. Are all the math secrets known? No, mathematics is a living, growing science. The science of mathematics is a never-ending quest with constant reward of new mathematics skills. A little reflection will show what predominant role mathematics plays In our everyday life and how it has become an indispensable factor for the progress of our present day world. It is the pivot of all civilization. Everybody has to calculate his income and balance his family budget, although only a few of them undergo any course of the university. This is the subject, which indisputably forms. Mathematics is the queen of all sciences and king of all arts. So mathematics education is of vital importance at school level. This will

provide the foundation block for future construction. Hence it becomes the primary duty of the teacher to make mathematics instruction as lovely as possible and also as effective as possible. The fact that the students experience varied difficulties in learning mathematics makes the teacher more responsible for teaching learning process to be fruitful.

## 1.2. MATHEMATICS A SCIENCE OF DISCOVERY

Mathematics is the discovery of relationships and the expression of those relationships in symbolic form in words, in numbers, in letters, by diagrams or by should experience the observational. But later, when its power of abstraction is adequately developed, it will be able to appreciate the certitude of the mathematical conclusions that it has drawn. This will give it the joy of discovering mathematical truths and concepts. Mathematics gives an easy and early opportunity to make independent discoveries. The children must not only have opportunities for making their own discoveries of mathematical ideas, but they must also have the practice necessary to achieve accuracy in their calculations. Today it is discovery techniques, which are making spectacular progress. They are being applied in two fields: in pure number relationships and in everyday problems, involving such things as money, weights and measures. Mathematics can be treated as an intellectual game with its own rules and without any relation to external criteria. From this view point, mathematics is mainly a matter of puzzles, paradoxes, and problem solving a sort of healthy mental exercise. Though mathematics has been with us for more than 5000 years, the subject has never been made as lively as it is today. The place of mathematical discovery and invention has accelerated amazingly during the last few decades. It has been said that mathematics is the only branch of learning in which theories of two thousand developing logical thinking and reasoning. The National Policy on Education (NPE)1986 a way of thinking, an art or form of beauty, and as human achievement.

## 1.3. PLACE OF MATHEMATICS IN THE SCHOOL CURRICULUM

Plato advocated the inclusion of mathematics in the school education

because mathematical reasoning disciplines the mind. He wrote over the portals of, curriculum forms an important part of the school curriculum. The Indian Education Commission (1966) emphasized the importance of mathematics in the school curriculum in view of the importance of quantification and the advent of automation and cybernetics in the scientific and industrial revolution. Mathematics curriculum comprises all those systematically planned activities carried out by the student individually or in group with or without the supervision of the teacher inside or outside the classroom or school with the definite purpose of realizing the aims and objectives of teaching mathematics. It is the pivot on which the whole process of teaching - learning revolves. It provides the necessary insight to the mathematics teacher in the selection of the learning activities, teaching methods,

learning resources and evaluation techniques. It helps the students in getting trained in skills necessary for his individual and social development, for selecting vocations in life, studying other subjects and pursuing a higher education in mathematics. A good curriculum provides experiences which are best suited to the age of the learner, the emotional, physical and intellectual maturity of the learner and his previous experiences and learning.

## 1. 4 CURRENT TRENDS IN MATHEMATICS CURRICULUM

The commission on Mathematics of the SMSG (School Mathematics Study Group), the Illinois Project (USA), the Cambridge Report, the Cockcraft Report (U.K) and many other curriculum reform groups had analysed the traditional high school and higher secondary school mathematics curriculum. Many important view points and recommendations had been put forth and some of these important observations have been summarized below. It has been suggested that from the very beginning the child should learn about real number system instead of being led by sharply distinguishing stages through the natural numbers, fractions and negative numbers to the rational number system and thereafter to the irrationals and the real number system. It means that contact between arithmetic and geometry should be maintained from the outset and used to introduce negative numbers and fractions immediately after some small natural numbers have become familiar. On the contrary Marshall H.Stone, is of the opinion that real numbers should not even be mentioned until the stage has been thoroughly set by the study of various finite and innumerable infinite number systems arising in arithmetic, algebra and geometry. If such a system can be carried out in elementary classes, then an adequate treatment of the real number system can be spread over in high school classes. In the secondary school programme, the most essential innovation that needs to be made is the introduction of basic concepts of abstract algebra and their application to geometry, through an appeal to groups and vector spaces. The concrete foundations for teaching abstract algebra are laid in arithmetic operations, set theory, and physical geometry. The study of abstract algebra can begin in class 7. Organization for European Economic Corporation has made the following observations regarding the high school mathematics curriculum. New mathematics has been included in the secondary school mathematics curriculum because modern mathematics may possibly be easier to learn and give a better understanding of the mathematical structure. It has been recognized that by cultivating an insight into the structure of mathematics the acquisition of manipulative skills will be considerably increased. While arithmetic is concerned with numerical computation and the properties of sets of numbers, algebra is concerned with the operational structures independently of the nature of the objects involved. By introducing an elementary algebra of sets, the child is able to realize that algebra is not restricted to the field of numerical operations.

## 1.5. RECOMMENDATIONS OF KOTHARI COMMISSION (1964-1966)

The Indian Education Commission (1964-1966) has envisaged a course of compulsory mathematics in Primary and Junior Secondary Courses. Diversification of courses has been recommended at higher secondary level with the result that mathematics at higher secondary stages is optional and is meant only for those who want to study higher mathematics or to take up vocations and professions requiring specialized knowledge of mathematics.

## 1.6 MENSURATION CONCEPT:

Mensuration is important concept in mathematics that involves the measurement of length, area, volume and other geometrical properties of shapes and objects. It is a fundamental concept that is often introduced to upper primary students and a strong understanding of mensuration is essential for solving real –word problems and for advancing to higher levels of math education. However, many students struggle with the concept of mensuration, and there is need to enhance the learning experience for these students.

Achievement can be defined as a measure of learner's level of knowledge, skills or performance (Ugwu, 2014). Brown (2005) described achievement as the level of goal accomplishment. Akinbobola(2006)described achievement of students as learning outcomes which include the knowledge, the skill and experiences acquired in both classroom and laboratory practices.

Several factors have been attributed to the poor performance in upper primary school mathematics, among which are: poor methods of teaching, poor interest in mathematics and lack of appropriate instructional materials for teaching mathematics at all levels of education in schools.Garvy (2008) emphasized that the students' poor achievement could be as a result of mathematical anxiety. Ifamuyiwa (2006) stressed that some learners personality variables such as gender can be responsible for the students' poor achievement in mathematics. Ogunkola (2002) opined that numerical ability and interest could influence students learning outcomes irrespective of the numerical the instructional strategy used. In addition, part of the problem is that most teachers still believe that the most effective means of communicating knowledge is via the conventional 'talk and chalk' strategy. With all these problems facing the students, the solution may lie in exposing students to active participation approaches during teaching and learning such as: Target task approach, laboratory method approach, delayed formalization approach, heuristic method (Obodo, 2004); Mathematical games, models and simulation (Agwagah, 2001); and concept mapping technique in teaching mathematical concepts (Imoko&Agwagah, 2006). Obodo (2004) held a view

that lack of interest is one of the factors responsible for poor achievement of students in mathematics. Interest is an important variable in learning because when one becomes interested in an activity, one is likely to be more deeply involved in that activity (Imoko&Agwagah, 2006). Ezike and Obodo (2001) defined interest as condition of wanting to know or learn about some objects. Interest simply means the likes and dislike or one's reference and aversion (George, 2008). Onah(2015) stated that achievement means gaining or reaching successfully while interest means curiosity or attention. No course in science and mathematics can be considered as complete without including some practical work. Improvisation and utilization of instructional materials have potentials in teaching of abstract concepts. Instructional materials can be improvised(Strengthening Mathematics and Science Education Project, 2010). Adebimpe (1997),Aguisiobo (1998) and Onasanya et al (2008), noted that improvisation demands adventure, creativity, curiosity and perseverance on the part of teachers.

GambariandGhana (2005) emphasized that the use of instructional materials stimulates learning and assist the teachers to properly convey the topic content to the learner in order to achieve better understanding and performance. Afolabi (2009) maintained that achievement of objectives depends largely on the use of improvised instructional materials in mathematics teaching and learning. Offorma (2004) stressed that teachers should be able to produce simple and inexpensive materials such as charts, posters, maps, pictures, drawings and models for effective teaching and learning. Improvisation is the act of using alternative resources to facilitate instructions whenever there is lack or shortage of some specific first hand teaching aids (Eniayeju, 2005).

Instructional materials are those resource materials used by mathematics teachers in the classroom. They are resources which both the teachers and students use for the purpose of ensuring effective teaching and learning (Obodo,2004). Resourceful and skillful teachers should improvise necessary instructional materials to promote academic standard in Nigerian schools (Abdu-Raheem & Oluwagbohunmi,2015). Shih, Kuo and Liu (2012) developed and evaluated instructional model and learning system and found that the model enhanced mathematical achievement. Mensuration is a branch of mathematics which deals generally with geometric shapes and measurement. Ask.com (2016) defined mensuration as a branch of mathematics which deals with the measurement of areas and volumes of different geometrical figures. The related parameters which are taught in mensuration include but not limited to types and properties of geometric shapes (plane or solid), the measurement of the dimensions that form the shapes, the diagrams and nets of the shapes, the area and volumes of the shapes, the properties of the shapes, the relationships between the properties of the shapes, the development and use of formula to solve mensuration problems. Generally, the relevance of mensuration and subsequent difficulties experienced by the students at senior secondary

level in Nigeria made a study on it pertinent. The concept has been consistent in the Chief WAEC Examiners' Report from 2010 – 2019 as area of students' difficulty. This study will thus focus on mensuration. Having seen the importance of mathematics as the determinant of quality of technological advancement in addition to students' difficulties in mensuration in particular, it is necessary to carry out a research to improve students' achievement and interest. This may be through the research on the effect of improvised instructional materials on the students' achievement and interest in mensuration at senior secondary level (SS I). There have been relatively few research studies which International Journal of Advances in Engineering and Management (IJAEM) Volume 2, Issue 5, pp: 361-370 www.ijaem.net ISSN: 2395-5252 DOI: 10.35629/5252-0205361370 | Impact Factor value 7.429 | ISO 9001: 2008 Certified Journal Page 363 evaluated the effect of instructional materials on achievement of students in mathematics but the extent of the quality and quantity of instructional materials that could enhance mathematics teaching and learning have not been generally agreed upon by researchers. In addition, there is lack of agreement about instructional strategies that could enhance the achievement and interest of students in mensuration. On these bases, this study examined the effect of improvised instructional materials on the students' achievement and interest in mensuration at upper primary level.

## 1.7 MODERN APPROACHES TO MATHEMATICS

**(i) Locating**

Finding your way around, locating yourself in space, orientation and special awareness, all mathematical ideas to enable precise, calculation, communication and manipulation of ideas.

**(ii) Measuring**

Comparison is the essence of measuring. Developing from simple distinction through relative scales to absolute scales.

**(iii) Designing**

Artistic design is often mathematical. Example: Pottery and fabric decoration, tiles pattern, stone carving. Tools intended for use also involve considerable design care.

**(iv) Playing**

Games have been part of human activity and most games have a Mathematical basis which goes beyond the simple ideas following rules and the working out of consequences.

**(v) Explaining:**

Explaining and the related process of predicting are activities which lift human cognition above merely experiencing the environment and responding to it. It would seem possible to view the mathematics curriculum through these topics within one culture or to use the heading within a multicultural environment as a device for enrichment. A cultural approach to mathematics curriculum is of great significance to mathematics education in India. The mathematics curriculum should be rooted in the culture of the different sects of the Indian people. The mathematical knowledge that the children learn in school should be based on the cultural experience that they have at home and outside the school. For effective and meaningful learning of mathematics, it is important to have a cultural basis for the mathematics curriculum.

## 1.8. PROBLEMS IN MATHEMATICS CURRICULUM

Mathematics and should appear at every stage of teaching the subject. But the problems must be real and significant and the more they arise from the needs and interests and activities of children, so much the better. All artificial problems should be avoided. Similarly superficial problems, involving all sorts of complex and unrealistic operations serve no useful purpose. The presence of a puzzle element in problems is often a great respond with unrestrained vigor and delight to number puzzles, magic squares etc. hand it must be borne in mind that mathematics cannot consist entirely of games and puzzles or purposeless, undirected investigations. System and organization, method and planning are essential.

## 1.9. MOTIVATION IN LEARNING OF MATHEMATICS

Mathematics is a universal subject, so much a part of life that anyone who is a participating member of mathematical achievement, however, is ultimately determined and limited by the opportunities they have had to learn. Mathematics is not restricted to a selected think mathematically, and they must practice. The Mathematics Study Panel also emphasized the importance of mathematics. Furthermore, the panel declared that it is essential that students develop math's proficiency. No Child Left behind Act directed that research about effective practices be a guide in changing the way mathematics is taught so that high standards are met leading to an improvement in achievement. Motivation Math incorporates research-based strategies and pedagogically sound principles for teaching and learning. This product is designed to support and enhance the best practices for teaching the TEKS. Motivation Math is founded on proceeds in small steps. Research indicates that this approach is associated with higher levels of student achievement.

**Students are guided through the learning process and are afforded opportunities for success which include**:

Introduction to skills

Guided practice

Independent practice

Assessment

Critical thinking activities

Homework with parent activities

Hiebert and Wearne reported that a critical attribute in regard to student learning in mathematics, is the nature of the learning task in which to engage students. Students need mental engagement in challenging and worthwhile mathematical tasks that emphasize the conceptual aspects of the topic and promote the formation of mathematical connections. This type engagement is a prerequisite to learning skills with meaning and being able to apply those skills to solve problems. Students must receive direct encouragement to think and persist with the mathematical task at hand.

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## 1.10. DIFFICULTIES IN LEARNING MATHEMATICS

Mathematics is such as abstract subject that most children experience difficulties in learning mathematics and the teachers who lack resource are also not up to the mark in teaching mathematics. It is also possible that the children are unable to understand the mathematical concepts thoroughly because they are taught children may not have the required entering behavior to learn the concept. They may not have the readiness and maturation to learn the concept. Moreover, Mathematics is a subject, which needs problem solving skills on the part of the children.

### 1.10.1. Learning to Learn

Of the various stages of learning “learning to learn” is one area which is not taken care of by teachers. One has to learn from cradle to grave as learning is a lifelong endeavor and process. But the strategies and techniques required for learning are either totally unknown to children or partially known to them. Seldom are efforts made by the essential to know the techniques of study, so they could be mastered. In the absence of techniques of study and lack of training in study skills or strategies, the children tends to develop distaste for studies, which we often call by a generic term “problem of study”.

1.10.2. Problems of Study

Children have difficulties with many academic subjects, of which arithmetic is merely one; some have specific delays in arithmetic, which will eventually be resolved; and some have persisting, specific problems with arithmetic. The causes for such difficulties are also varied, though they tend to overlap: they include individual characteristics (e.g. unusual patterns of brain development); inadequate or inappropriate teaching; and lack of preschool home experience with mathematical activities and language. In the matter of subject-related doubts of children, the teacher comes forth fear/phobia of examinations, lack of knowledge in procedure for study, non- acquisition of study strategies required for mastering the subject matter, the teacher seldom is of any help to the children.

The common problems identified based on interaction with children are as follows:

1. Not able to remember the things studied, particularly in the examination hall.
2. Not able to understand and memorize study portions in totality. Despite the best of efforts children are able to remember in parts, that too in an incoherent manner, but not the whole portion ever.
3. Not able to have and sustain concentration.
4. Not able to contain the continuous cross current of disruptive ideas that Impede study.
5. Not able to sit for study because of the spell the other attractive pastime activities such as computer games, movies, music and so on have over the mind of the student.

1.11. INTERACTIVE SESSIONS WITH THE CHILDREN

The significance of the study of the kind which deals with study strategies or techniques emerged from the interactive sessions the investigator had with the children of rural upper primary schools.

**In the course of the controlled interaction with children, what emerged can be summarized as follows:**

1. Children talking about their problems of study such as not able to
concentrate; not able to grasp the subject matter studied; not able to recollect during the examinations, etc.
2. Querying the high performing children as to how they study, and how
they overcome study related problems, if any, they faced.
3. Having an intake session of the points regarding the strategies they follow.
4. Discussing with them the benefits of such strategies and to know whether
there are subject - specific strategies.

5. Summarizing the view points.

The children revealed that the techniques they follow have been developed by them over a period of years. The children revealed that it was essential that the strategies were easily understood about the subject matter so that study could become a meaningful, productive, and rewarding experience.

1.12. STRATEGIES / TECHNIQUES

A strategy refers to a set pattern or patterns or procedures or pictures or diagrams or sequential steps of doing tasks related to their study so as to learn effectively. Study techniques and strategies should form a part of the school curriculum; but it is not the case. The curricular matter hardly touches upon the strategies to be followed, so as to actualize the objectives of school education. For children including children in elementary schools, youngsters in secondary school and adults in colleges or training programme learning from teachers and books becomes a dominant activity in their lives. They are expected to become professional readers, but they are rarely given any training to learn. Successful children somehow acquire study strategies even though strategy instruction has not been incorporated into but the benefits of those strategies in Indian context have not been studied. But the from the provider of knowledge to a trainer of skills is called for. The teacher will have to teach not the subject alone but the skill to learn their subject as well. Learning to learn and developing strategies for study will give permanent and secure feeling to children and help them develop confidence in them. Earl to learn; the man who has realized that no knowledge is secure, that only the process view.

**1.13. NEED FOR THE STUDY**

The study of mensuration holds significant importance across various fields and in everyday life. Here are some reasons highlighting the need for studying mensuration:

1. **Real-world Applications**: Mensuration concepts are widely used in everyday life situations such as construction, carpentry, interior design, cooking, and gardening. Understanding concepts like area, volume, and perimeter helps individuals make informed decisions and solve practical problems efficiently.
2. **STEM Education**: Mensuration is an integral part of STEM (Science, Technology, Engineering, and Mathematics) education. It provides a foundation for understanding geometric principles, spatial reasoning, and quantitative analysis, which are essential for success in STEM fields.

3. **Problem-solving Skills**: Studying mensuration enhances problem-solving skills by requiring students to analyze complex shapes, spatial relationships, and measurement units. It fosters critical thinking and logical reasoning abilities, which are valuable in academic and professional settings.
4. **Career Opportunities**: Proficiency in mensuration opens up a wide range of career opportunities in fields such as architecture, engineering, construction management, surveying, and urban planning. These professions require individuals to apply geometric principles to design, analyze, and optimize structures and systems.
5. **Mathematical Literacy**: Mensuration contributes to mathematical literacy by providing students with practical applications of mathematical concepts. It helps students develop a deeper understanding of geometry, measurement, and algebraic relationships, which are essential components of mathematical literacy.
6. **Interdisciplinary Connections**: Mensuration intersects with various other disciplines, including physics, biology, art, and computer science. Understanding geometric concepts such as shape, size, and dimensionality facilitates interdisciplinary connections and promotes holistic learning experiences.
7. **Spatial Awareness**: Studying mensuration enhances spatial awareness and visualization skills by requiring students to mentally manipulate and conceptualize three-dimensional objects. This spatial reasoning ability is crucial for interpreting maps, blueprints, diagrams, and geometric models.
8. **Standardized Testing**: Mensuration concepts are frequently assessed in standardized tests such as state assessments, college entrance exams, and international assessments (e.g., TIMSS, PISA). Proficiency in mensuration is therefore essential for academic achievement and college readiness.
9. **Problem-solving in Technology**: Mensuration concepts are foundational for working with computer-aided design (CAD) software, 3D modeling tools, and simulation software used in various industries. Understanding mensuration allows individuals to accurately model and analyze digital representations of physical objects and systems.
10. **Cultural and Historical Significance**: Mensuration has played a significant role throughout history in architecture, art, and scientific discoveries. Studying mensuration enables students to appreciate the cultural and historical significance of geometric principles and their impact on human civilization.

Overall, the study of mensuration is essential for developing practical skills, promoting mathematical literacy, fostering interdisciplinary connections, and preparing individuals for academic and professional success in a rapidly evolving world.

## 1.14. SIGNIFICANCE OF THE STUDY

The significance of studying mensuration lies in its broad implications across various fields and its practical applications in everyday life. Here are several key points highlighting the significance of studying mensuration:

1. **Problem-solving Skills**: Mensuration involves analyzing and solving problems related to geometric shapes, sizes, and measurements. By studying mensuration, individuals develop critical thinking, analytical reasoning, and problem-solving skills that are applicable across a wide range of contexts.
2. **Practical Applications**: Mensuration concepts are used in countless real-world scenarios, from measuring the area of a room for carpeting to calculating the volume of ingredients for a recipe. Understanding mensuration enables individuals to make informed decisions and solve practical problems efficiently in areas such as construction, engineering, design, and finance.
3. **STEM Education**: Mensuration is an essential component of STEM (Science, Technology, Engineering, and Mathematics) education. It provides a foundation for understanding geometric principles, spatial reasoning, and quantitative analysis, which are fundamental to success in STEM fields.
4. **Career Opportunities**: Proficiency in mensuration opens up numerous career opportunities in fields such as architecture, engineering, construction management, surveying, urban planning, and data analysis. Many professions require individuals to apply mensuration concepts to design, analyze, and optimize structures, systems, and processes.
5. **Mathematical Literacy**: Studying mensuration contributes to mathematical literacy by providing practical applications of mathematical concepts. It helps individuals develop a deeper understanding of geometry, measurement, and algebraic relationships, which are essential components of mathematical literacy and critical for success in academic and professional settings.
6. **Interdisciplinary Connections**: Mensuration intersects with various other disciplines, including physics, biology, art, and computer science. Understanding mensuration facilitates interdisciplinary connections and promotes holistic learning experiences by demonstrating how mathematical concepts are applied in diverse fields.
7. **Spatial Awareness**: Mensuration enhances spatial awareness and visualization skills by requiring individuals to mentally manipulate and conceptualize three-dimensional objects. This spatial reasoning ability is crucial for interpreting maps, blueprints, diagrams, and geometric models, and it has practical applications in fields such as navigation, architecture, and engineering.

8. **Standardized Testing**: Mensuration concepts are frequently assessed in standardized tests such as state assessments, college entrance exams, and international assessments. Proficiency in mensuration is therefore essential for academic achievement, college readiness, and success in standardized testing.
9. **Cultural and Historical Significance**: Mensuration has played a significant role throughout history in architecture, art, and scientific discoveries. Studying mensuration enables individuals to appreciate the cultural and historical significance of geometric principles and their impact on human civilization.

In summary, the significance of studying mensuration lies in its practical applications, its role in developing essential skills, its importance in STEM education and careers, its contribution to mathematical literacy, its interdisciplinary connections, and its cultural and historical significance.

## 1.15. SCOPE OF THE STUDY

1. Only problems of children in basic mathematical operations will be considered for the research work.
2. The study is restricted to one upper primary class which will serve as the experimental group and another group will serve as the control group.
3. The effectiveness of the selected study techniques on the academic achievement in mathematics is to be studied.

## 1.16. STATEMENT OF THE PROBLEM

"**Enhancing the learning concept of mensuration among upper primary students through instructional materials"**

### 1.16.1. Definition of Key Expressions in the Research Title

**Instructional Materials**: Refers to the physical or digital resources used to support teaching and learning, such as textbooks, workbooks, worksheets, manipulatives, multimedia presentations, modals and educational games.

**Enhancing Learning**: Involves activities or strategies aimed at improving students' understanding, retention, and application of mensuration concepts. This could include engaging students in hands-on activities, providing real-world examples, using visual aids, and incorporating interactive learning experiences.

**Mensuration Concepts**: Refers to the mathematical principles and skills related to measurement, geometry, and spatial reasoning. This could include concepts such as area, perimeter, volume, surface area, geometric shapes, and units of measurement.

**Upper Primary Students**: Specifies the target audience for the instructional materials, typically referring to students in grades 7 to 8 or ages 9 to 12. Instructional materials should be age-appropriate and aligned with students' cognitive abilities and learning objectives.

**Demonstration**: Involves showing students how to perform specific tasks or solve problems related to mensuration concepts. This could include step-by-step explanations, modeling techniques, and providing examples for students to follow.

**Practice Exercises**: Refers to activities or assignments that allow students to apply their understanding of mensuration concepts through hands-on practice. This could include worksheets, problem-solving tasks, games, and group activities.

**Assessment**: Involves evaluating students' understanding and mastery of mensuration concepts. This could include quizzes, tests, performance tasks, projects, and informal assessments such as observations and class discussions.

**Differentiation**: Refers to the process of adapting instructional materials and activities to meet the diverse needs of students. This could include providing additional support for struggling students, offering extension activities for advanced learners, and accommodating students with special needs.

**Feedback**: Involves providing students with information about their performance and progress in mastering mensuration concepts. This could include verbal feedback, written comments, grading rubrics, and self-assessment tools.

**Integration**: Refers to connecting mensuration concepts to other areas of the curriculum, such as science, technology, engineering, art, and mathematics (STEAM). This could include interdisciplinary projects, cross-curricular activities, and real-world applications of mensuration concepts.

### 1.17 Background of the study:

All materials that could be used in classroom situation to facilitate teaching learning process are called instructional materials. Instructional materials are considered as powerful means for teaching. Students are motivated by the use of teaching aids. Teaching aids give the realistic picture on theory and practice. Instructional materials are a generic term used to describe the resources teachers used to deliver instruction. Instructional materials can support student learning and increase student success. Ideally, the instructional materials will be tailored to the content in which they are being used, to the students in whose class they are being used, and the teacher.

Instructional materials come in many shapes and sizes, but they all have in common the ability to support student learning. Instructional materials can refer to a number of teacher resources; however, the term usually refers to concrete examples, such as worksheets or manipulative. Teaching materials are different from teaching “resources”, the latter including more theoretical and intangible elements, such as essays or support from other educators, or places to find teaching materials. Instructional materials are important because they can significantly increase student achievement by supporting student learning. For example, a worksheet may provide a student with important opportunities to practice a new skill gained in class. Instructional materials, regardless of what kind, all have some function in student learning. Instructional materials can also add important structure to lesson planning and the delivery of instruction. Particularly in lower grades, instructional materials act as a guide for both the teacher and student. They can provide a valuable routine. Johnson defines “Instructional materials are essential for the mathematics teachers as spokes are for the wheel. They are necessary for learning mathematics pleasant satisfying excellence. Models, pamphlets, films, given that would be difficult to obtain in any other ways”. “Dienes subject has following words to say about the use of materials, “The use of concrete materials in the classroom to build up mathematical imagery. Such imagery once build up can be manipulated without the aid of any concrete objects.” 2 Since mathematics is an abstract as well as logical science, it is also a difficult. Mathematics education is a compulsory subject to be taught to all the student of Nepal. So it can be made interesting and understandable to the students only if the teacher is well-qualified and skillful in handling the various kinds of teaching approaches correctly with the use of appropriate materials. There are lots examples of instructional materials. Some of them are modals,audio, recording, video, charts, tape, pictures and etc. Mainly, instructional materials are categorized into three different kinds. They are: 1. Literature 2.Audio-visual aids 3.Models and manipulative materials. All of these instructional materials are very important in teaching and learning process because all of these serve as aid for instruction. Through this, the teachers will able to make his/her strategies in teaching more effective and meaningful and the students will be able to understand, easily absorb the lesson. Instructional materials serve as the channel between teacher and students in delivering the instruction. They may also serve as the motivation on the teaching-learning process. Instructional materials are highly important for teaching, especially for inexperienced teachers. Teachers relay on instructional materials in every aspect of teaching. They need materials for background information on the subject they are teaching. Young teachers usually have not built up their expertise whenever they enter into the field. Teachers often use instructional materials for lesson planning. These materials are also needed by teachers to access the knowledge of their students. Teachers often assess students by assigning tasks, creating projects and administering exams. Instructional materials are

essential for all of these activities. Teachers are often expected to create their own lesson plans. This can be difficult, especially if the teacher has limited background knowledge on the subject. Teachers are expected to have a wide variety of expertise in many different fields. Often, they need instructional aides to supplement their knowledge. Instructional materials can help provide background knowledge on the subject. Lesson planning is often the most stressful aspect of teaching. Teachers are usually dependent on them to do their job properly. Assessing students correctly can sometimes be a challenge. There is some controversy about the effectiveness of exam in assessing the ability of students. 3 Instructional materials can offer some insight into the best methods of creating exams. These materials can also help teachers create assignments and projects idea for students. Teachers are required to use several different methods for assess their students in order to provide the most accurate assessments. Instructional materials often provide innovative and creative way to assess students' performance. It is hard to imagine any teacher who is capable of teaching effectively without the accompaniment of instructional materials most likely experiences stress and anxiety on a daily basis. In the context of Tiruvallur district, most of the schools are still using the traditional methods of teaching. Teachers are using lecture and other traditional methods for teaching mathematics. A few of the school budget is allocated for educational materials which includes both stationery and instructional Aids. This sum is inadequate for the provision of instructional materials. In this condition, it is evident that the use of instructional materials in school is limited. Without using necessary materials the teacher will be unable to adopt modern inquiry. As a math teacher, one needs to find the best instructional materials for mathematics education. It is important for students to get proper math education, but many students find it difficult to learn. In many cases, mathematics education is one of the most difficult disciplines to teach. Math classes, particularly at higher levels are usually stale and boring, consisting of the teaching giving a lecture at the chalkboard. But supplementary instructional materials in mathematics can change. The way you teach lesson is use a variety of math class educational materials to create to different learning styles. One of the biggest problems with understanding math is that it is hard for some students to grasp the concepts in a traditional system. Use games in math class to make it fun. Mathematics education doesn't have to be boring. Instructional materials are important for effective teaching. They play vital role in making teaching interesting and efficacious in any level of education, in their lack the process of teaching becomes difficult and ineffective. Statement of the Problem Mathematics is compulsory subject in our school education. Some teachers teach mathematics in classroom with their best but many students are unable to understand mathematics adequately. The view of people toward mathematics is not positive till now, though many researches carried out. Mathematics is still considered as a complex subject on the view-point of student and their parents. Most of the students are failed in

exam due to its cause. It means it is a major issue of our educational society of Nepal. There are many factors which play vital role in mathematics achievement out of them teaching materials or instructional materials is one of the most influencing factors for achievement of mathematics. Students participate actively in learning mathematics if teachers use appropriate instructional materials. So teacher should select appropriate instructional materials. Appropriate instructional materials motivate students to learn and make learning meaningful. In general most of the children face failure in mathematics at school level due to teaching without instructional materials. In the classroom, teachers teach mathematics without using teaching materials. So, the researcher will study on 'Effect of instructional materials in teaching mathematics at primary level. 'In others words the study has sought answers to the following research questions: • Is there important role of instructional materials in teaching mathematics? • Does achievement differ significantly when instructional materials are used? • How do students feel while teaching with materials? Significance of the Study The teaching of mathematics has concerned some factors like as teaching style, teaching strategies, teaching methods and using of instructional materials. Teaching of mathematics becomes more meaningful by use of proper materials. Mathematics is one of the major subjects in our education system. It is taught from the elementary level. The present problem faced by people is of well understanding of its structure. Students, curiosity, motivation, participation play important role to promote mathematical skills in the students. For this, teacher should select proper instructional materials. While implementing the curriculum of mathematics using proper instructional materials can help students to learn mathematics with proper understanding. So there should be research on instructional materials. The significance of this study can be stated as follow: • This study helps to identify the role of instructional materials on achievement of mathematics. • It helps to find out whether the instructional materials are used in our school environment or not? • It helps to primary level mathematics teacher to use instructional materials in classroom environment. • It helps to educational policy makers, and curriculum framer as a simple reference for selecting the proper instructional materials.

### 1.18 Objectives of the Study:

This research was carried out framing the following objectives

- To show the effectiveness of instructional materials in teaching mensuration at upper primary level.
- To explore feelings of students during experimental period.

1.19 Hypotheses**: Hypotheses** are the assumptions or guesses about the population involved. Such assumptions that may or may not be true are called hypotheses. In words, hypotheses as used in research refer to prediction of results made before a study is made. In conducting any research the next step after the selection of the problem is to formulate hypotheses. A tentative answer to a research question is called a research hypothesis and an assertion or conjecture about the distribution of one or more variables or one or more population is called a statistical hypothesis.

**Research Hypothesis** a) There is difference between the achievement scores of experimental and control groups after experiment. Statistical Hypothesis a) H : μ1 = μ2 (Null Hypothesis) H1: μ1 ≠μ2 (Alternative Hypothesis) Where μ1 and μ2 are the means score of the experimental and control groups on pretest. b)H0 : μ3 =μ4 (Null Hypothesis) H1 :μ3 ≠μ4 (Alternative Hypothesis) Where μ3 and μ4 are the means score of the experimental and control groups on posttest.

- There is no significance difference between control groups scores on pre-test and post-test
- . There is no significance difference between experimental groups scores on pre-test and post-test
- There is no significance difference between experimental and control groups scores on post-test.
- There is no significance difference between experimental of boys and girls scores on post- test
- There is no significance difference between control and experimental group scores of boys on post-test
- There is no significance difference between control and experimental group scores of girls on post-test
- There is no significance difference between experimental group post test scores on parent qualification
- There is no significance difference between experimental group post test scores on parent occupation
- There is no significance difference between experimental group post test score of Tamil medium and English medium

- There is no significance difference between area related problems scores on post test

**1.20 Delimitation of the Study**:

It is impossible to look after all the aspects related to research topic in a single specific research study. Therefore delimitation of the study should be made clear. To make the research study systematic objective the following delimitations were followed: • The study was conducted to the grade-VIII students of PUMS Nasarathpet, PUMS Thirumazhisai in Tiruvallur district. • The topic "Mensuration" was taught. • The experimental time duration was 1 month only. • Some of the variables like socio-economic status, parents' education, IQ were controlled. • The study was conducted to find out the effectiveness of instructional materials.

**1.21 Definition of the Related Terms**

**Achievement**

The achievement of the study is defined in terms of the scores obtained by the learners.

**Instructional Materials**

Instructional materials means all materials that are designed for use by pupils and their teachers as a learning resources and help pupils to acquire facts, skills, or opinions or to develop cognitive processes

**1.22 ACTIVITIES FOR THE STUDENT:**

**Shape Investigation**: Students can conduct a survey within their school to identify common shapes found in classrooms, school buildings, or playground equipment. They can collect data on the types and sizes of shapes observed, and then analyze the data to determine which shapes are most commonly encountered.

**Measurement in Daily Life**: Students can explore the role of measurement in everyday activities such as cooking, gardening, or sports. They can interview family members or community members to gather information on how measurement is used in different contexts, and then present their findings in a report or presentation.

**Geometry in Architecture**: Students can research famous buildings or structures from around the world and identify the geometric shapes and patterns present in their architecture. They can

create a poster or multimedia presentation showcasing their findings, along with explanations of how geometry is used in building design.

**Mathematical Puzzles and Challenges**: Students can explore mathematical puzzles and challenges related to mensuration, such as tangram puzzles, Sudoku, or geometric riddles. They can investigate different strategies for solving these puzzles and present their findings to their classmates.

**Creating a Geometric Cookbook**: Students can work together to create a "geometric cookbook" featuring recipes that incorporate geometric shapes and measurements. They can research recipes, measure ingredients, and calculate cooking times and temperatures, then compile their recipes into a cookbook to share with their classmates.

**Geometry in Nature**: Students can investigate geometric patterns and shapes found in nature, such as the symmetry of flowers, the shapes of leaves, or the patterns of animal markings. They can go on a nature walk to observe and collect examples of geometric shapes in their environment, then create a collage or presentation to showcase their findings.

**Mathematical Art Gallery**: Students can explore the intersection of math and art by creating geometric artwork using various materials such as paper, clay, or recycled materials. They can research different geometric patterns and designs, then create their own artwork inspired by mathematical concepts such as symmetry, tessellations, or fractals.

**Survey and Data Analysis**: Students can design and conduct a survey to collect data on a topic of interest related to mensuration, such as the heights of classmates, the sizes of different objects in the classroom, or the lengths of various items found at home. They can then analyze the data using graphs, charts, and other visualizations to draw conclusions and make predictions.

**Mathematical Modeling**: Students can explore mathematical modeling by designing and building scale models of real-world objects or structures using geometric shapes. They can research the dimensions and proportions of the object they wish to model, then use their knowledge of mensuration to create an accurate representation at a smaller scale.

**Mathematics in Sports**: Students can investigate the role of geometry and measurement in sports such as basketball, soccer, or track and field. They can research how measurements such as distance, angle, and time are used in different sports, and explore how geometry influences the design of sports equipment and playing surfaces.

# CHAPTER II

# REVIEW OF RELATED LITERATURE

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# REVIEW OF RELATED LITERATURE

## 2.0 Introduction

Any worthwhile research study in any field of knowledge requires an adequate familiarity with the work which has already been done in the same area. A summary of writings of recognized authorities and of previous research provides evidence that the researcher is familiar with what is already known and what is still unknown and untested. Since affective research is based upon past knowledge, this step helps to eliminate the duplication of what has been done and provides useful hypotheses and helpful suggestions for significant investigation.

Related literature includes theoretical discussions, review of the status of knowledge by authorities, philosophical papers, description and evaluation of current practices and empirical researches. Any objective, formal, systematic and scientific research begins with a review of related literature. The original ideas and concepts to some extent come out of researcher's mind, but to a large extent from the collective body of prior work. There is much value in summarizing the past work in a field and bringing it up to date. It helps to contribute new knowledge in the field of research.

Citing studies that show substantial agreement and those that seem to present conflicting conclusions helps to sharpen and define understanding of existing knowledge in the problem area provides a background for the research investigation and makes the researcher aware of the status of the issue. Parading a long list of annotated studies relating to the problem is ineffective and inappropriate. Only those studies that are plainly relevant, competently executed and reported should be included

**Good, Barr and Scates (1935)** stated that the review of related literature serves the following purposes: a) to show whether the evidence already available solves the problem adequately without further investigation, b) to provide ideas, theories and explanations valuable to formulation of the problem, c) to suggest methods of research appropriate to the problem and d) to locate comparative data useful in the interpretation of result. Borg (1965) quoted that the literature in any field, forms the foundation upon which all future work will be built. Scanning of relevant research report guides the researcher in the right direction, highlighting the pit falls of the earlier studies showing him the landmarks achieved. Also, a synthesized collection of previous studies helps the researcher to identify the significant overlaps and gaps among the prior ones.

The investigator can probe into the neglected areas, which need more concentration. Further, the review of related research enables the investigator to get to the frontier in the field of his problem. Until the investigator has learnt what others have done and what still remains to be done in his area, he cannot develop a research project that will contribute to furthering knowledge in his field.

## 2.1. Review of related literature

The review of literature provides the researcher an opportunity of gaining insight into the measures, objects, samples, tools and approach employed by other research works. Capitalizing on the review of expert researchers can be fruitful in providing helpful ideas and suggestions. While review articles that summarize related studies are useful, they do not provide a satisfactory substitute for an independent research. Even though the review of related literature is not a substitute for an independent work, it is one of the first steps in the research process. It is a valuable guide to define the problem, to recognize its significance, to suggest promising data gathering devices, to appropriate the study design and the sources of data for affective analysis and to arrive at fruitful conclusions **(Kumari and Bhaskara Rao, 2000).**

Review of related literature is an essential part of the research. It is a comprehensive summary of previous research on a topic. Literature review surveys books, scholarly articles, and any other sources relevant to a particular issue, area of research, or theory, and by so doing, provides a description, summary, and critical evaluation of these works in relation to the research problem being investigated. The purpose of a literature review is to provide foundation of knowledge on topic. Identify areas of prior scholarship to prevent duplication and give credit to other researchers. This chapter presents the review of the related empirical literature, theoretical literature and Conceptual Framework of the study. The related and relevant studies provide the researcher to answer the questions what and how the related studies have been carried out. It provides the researcher in making his problem more realistic, precise, researchable and meaningful. It helps to conduct the research program and gives a better idea for research. Thus the review of literature is an important and essential guideline of research planning. In this study the researcher reviewed the considerable related and relevant literature carried out by various researchers in the field of errors in mathematics.
So, I collected the different unpublished thesis, some books, journals, and articles, researches which are related to effectiveness of teaching materials while teaching mensuration and others topics of

mathematics. By deeply study of these reports, I reviewed the following literature as academic writing.

This chapter reviews the different features of the articles and findings of different researchers. To conduct any research researchers needs to review the related literatures so that a researcher gets ideas and guideline for his/her research. Some related literatures which are received by the researcher are discussed as followed:

**Adan,** (2010) did a research on the topic " The experimental teaching in some of topics in geometry". The aim of this study was to compare the experimental teaching method with the teacher centered traditional method based on students' success. This study had conducted with 54 students, randomly divided into two groups; an experimental and a control groups. Experimental teaching method wad used to teach experimental group and traditional teaching method was used for control group. The test was applied to both groups in two different times. The first test was applied before the treatment and the second test was applied after the experiment. The scores of the students were compared by applying t-test at 0.05 level of significance. According to the research results, it was found that experimental teaching method was more effective than teacher centered traditional teaching method in the knowledge and comprehensive level.

**Adhikari**, (2014) did research of the topic " Effectiveness of experimental verification in teaching geometry at secondary level." The main objective of this study was to analyze the effect of experimental verification in learning mathematics. A pretest, post-test equivalent group design was adopted for study. Two groups were selected by stratified sampling method from two government schools of Chitwan district. A pre-test was administered to both groups which resulted that the groups were comparable at 0.05 level of significance. Both experimental and control groups were taught by researcher for 3 weeks by using and without using experimental verification respectively. A sample of 40 students was selected for both experimental and control groups. After the completion of experiment, an achievement test was administered for both groups. The result of test was analyzed by using t-test at 0.05 level of significance. Researcher found that mean achievement scores of students 9 taught by using experiment verification was better than the mean achievement scores of the students taught without using experimental verification.

**Baral,** (2005) did a study on “The effectiveness of the instructional materials in teaching geometry at primary level.” The researcher studies primary level (class -5) students in kaski district. Each class contains 20 students. Instructional materials were used with the experimental groups to

teach geometry unit. The same unit was taught to control group using only the text and traditional instruction. The study was conducted over a period of 20 days. Using t-test, the researcher concluded that the experimental group scores significantly higher than the post-test than the control group.

**Bhusal,** (2000) did a research on "A study on the effectiveness of teaching geometry using discovery module and expository module of teaching in secondary level."The aim was to find out the discovery module of teaching geometry is more useful than expository to prove geometrical theorems as well as to compare the achievement of the students taught by using discovery and expository module of teaching. Thirty students were sampled and divided into two equivalent group. They were taught for 3 weeks. The t-test was applied to draw the conclusion that discovery module of teaching was better than the expository module of teaching in geometry.

**Clung,** (1997) conducted the research on "A study on the Use of Manipulatives and Their Effect on Students Achievement in High School Algebra I Class." The purpose of the study was to evaluate the effects of manipulatives on students achievement in high school algebra I class. The study was conducted during the third nine weeks grading period in the spring of 1997 at a high school in Lewisburg, West Virginia. The study groups used in the study were two algebra I classes. One class had an enrollment of 24 students and the other enrollment of 23 students. The classes were sophomores and juniors. The groups and instructional strategies used included: (1) Group A (control group)…students were taught using the traditional teaching method of lecture, homework, and in-class worksheets. (2) Group B (experimental group) …students were taught using the traditional method of lecture, and homework but instead of in-class worksheets, students worked with the manipulative algeblocks. Both groups were taught at the same rate and by the same method except for the use of the manipulative. A pre-test was administered to each group at the beginning of the 10 study and at and the result tested to be certain that the groups were homogenous. The results were analyzed using a two- sample t-test and at 0.05 level of significance, no significance difference was identified in the achievement levels of the two groups. A post-test identical to the pre-test was given to the both groups at the conclusion of the study in order to determine if the groups were homogeneous. The results of the posttest were also analyzed using two sample t-test. At 0.05 level of significance, there was a significance difference in the achievement levels of the two groups at the conclusion of the study. When comparing the mean scores of the post-test, it was discovered that the mean score of group A was higher than that of group B which would indicate that the students taught using traditional method of lecture, homework, and in-class worksheets outperformed the students taught using the manipulative.

**Ernest,** (1994) conducted on study on “Evaluation of the effectiveness and implementation of math manipulative.”The study consisted of 40 high school teachers from 26 schools. The teachers attended the weekly long training workshop in the use of manipulative implemented the teaching strategies discussed during the workshop in their classroom instruction during the following year, then attended a fellow up session it discuss strategies and problems identified during the implementation phase of the study .Data was gathered to evaluate the week long teacher training workshop and the implementation of manipulative in classroom instruction. On-site observation were conducted to record utilization by course and manipulative, student participation, students attitudes towards the manipulative and interaction with the content. Evaluation of the workshop revealed that the teachers found the quality of instruction to be excellent to very good. Evaluation of the math manipulative and that “on task” involvement was very high. Teachers reported that the students enjoyed and were more interested in assignment when manipulative were used Ghimire, (2012) conducted a research on “Effect of reinforcement in learning mathematics at secondary level". The main objective of this study was to investigate the effect of reinforcement on students' achievement. A pre-test, post-test non- equivalent control group design was adopted for the purpose of the study. Two schools' students of grade-IX were selected purposively for experimental and control groups. The experimental and control groups of students were taught statistics through 11 reinforcement teaching strategy and conventional teaching strategy for 15 days. After completing the experiment, achievement test on the unit of statistics was administered to both groups and mean scores were calculated from the sample of 20 students in each group. The difference in mean achievement scores was tested using t-test for determining statistical difference between them. The statistical t-test at the 0.05 level of significance and the classroom observation showed that the reinforcement teaching technique was better than the conventional teaching technique in teaching statistics.

**Ghimire,** (2001) did research on the topic " A study on the impact of experimental verification in teaching the deductive proofs of geometric theorems." The aim of the study was to find the effect of prior use of experimental verification on proving the geometric theorem. The study was conducted among 30 students of grade-IX of two different schools for 15 days. At the end of the experimentation time an achievement test was conducted and the scores were analyzed by using t-test with 0.05 level of significance. He concluded that there was a good effect of the prior use of experimental verification in proving the geometric theorem.

**Gyawali**, (2009) conducted a research on " The study of effectiveness of Van Heile approach in teaching geometry at secondary level". The objectives of this study were to explore the effectiveness of Van Heile approach in teaching geometry and reducing the gender difference in achievement in geometry. For this study 40 students were selected as sample involving in control and

experimental groups 20/20 students in each group. This study was experimental quantitative type. In this study researcher found the mean achievement of the students taught by Van Heile's approach and the conventional method. Using t-test, the researcher concluded that Van Heile's approach more effective than the conventional method in geometry at secondary level. K. C. (2005) did a research on the topic " Attitude of secondary level students towards the role of experimental verification for the theoretical prods in geometry". The sample of this study contained 128 grade-X students from four different schools. As the instrument, opinionnaire was used to collect the attitude of students. The set of opinionnaire contained 28 statements supporting to the role of experimental verification for the theoretical proofs of geometry. For the analysis chi-square test with 0.05 level of significance was applied. He concluded that the students have 12 positive attitudes towards the experimental verification for the theoretical proof in geometry.

**Khanal,** (2014) did experimental research on the topic " Effect of reward in learning mathematics at basic level". The main objective of this study was to compare the mathematical achievement of grade-IV students taught by providing reward and without providing reward. A pre-test, post-test non-equivalent control group design was adopted for the purpose of the study. 18 students of Shree Navajyoti Lower Secondary School, Nawalparasi, were selected for experimental group. 20 students of Shree Kumariwati Higher Secondary schools, nawalparasi, were selected for control group. The experimental and control group of students were taught geometry through reward teaching strategy and conventional teaching strategy respectively for 20 periods. At the end of the experiment, achievement test on the unit of geometry was conducted to both groups and mean scores were calculated. The difference in mean achievement scores was tested using t test. In conclusion, the researcher found that the mean score of experimental group was more than the control group. He was concluded that the mean achievement score of students taught by providing reward became higher than main achievement score of student taught without providing reward in teaching mathemat. The abosve studies had been done to find out whether the achievement of students in mathematics is affected by the variables such as materials, mathematical games, rewards, puzzles etc. or not. These studies become helpful materials for researcher to draw the conclusion of his research work. most of the researches were related to secondary level and this research became only one research related to instructional materials for teaching mensuration at primary level.

**Tiwari (2014)** conducted research on impact of manipulative materials in teaching mathematics at basic level in Nawalparasi district. The objectives of this study were to compare the achievement in mathematics of grade V students taught by using manipulative materials and without using manipulative materials and explore the feeling of the students and their activities in the class

while teaching them by using manipulative materials. For this research pre-test, post-test and non-equivalent group design was adopted. Two school and 40 students were selected randomly as a sample of this study. This study found that the mean of the achievement of the 8 students teaching using manipulative materials was higher than the mean of achievement of the students teaching without using manipulative materials.

**Chaudhary (2011)** conducted study on effectiveness of instructional materials on teaching mensuration at secondary level grade X. This study has objectives to compare the achievement of students taught by using instructional materials and without materials. This study followed pre-test post-test equivalent group design. Researcher has taken the sample of this study from Siraha district. Researcher chooses 44 students as the sample of this study. Experiment and control group was determined by tossing as coin. In this research, researcher found that the achievement of the students of experimental group has better achievement that the students of control group.

**Karki (2010)** did research on the topic on a study on the effectiveness of instructional materials in teaching geometry at grade X. The objectives of this study were to find the effectiveness of instructional materials in teaching geometry at grade X in Bhaktapur district. This study had taken 40 students as a sample from a single school. This study found that the mean achievement score of students taught with using different instructional is higher than the mean score of students taught without using instructional materials. Finally, it found that the geometry teaching by using different instructional materials causes better achievement than the achievement come by the teaching without using instructional materials.

**Tella (2007)** did a study on impact of motivation on students' achievement and learning outcomes in mathematics among secondary school in Nigeria. This study has objectives to explain learning outcomes in senior secondary mathematics in term of motivating students towards academic gains in the subject. The null and alternative hypothesis was tested at 0.05 level of significance of the study. This study was adopted ex-post facto research design. It comprised all senior secondary students of North-West and South-West local government areas of OYO state of Nigeria, as a population of this study. Whereas 450 students were randomly drawn from 10 selected secondary school to make a sample of the study. This study used questionnaire, in-depth interview as research tools. Data collected from different tools were analyzed by using inferential statistics like as t-test and ANOVA. This study concluded that motivation has impact on academic achievement of secondary 9 school students in mathematics with respect to gender. It also revealed that highly motivated students perform better academically than the lowly motivated students.

**Gautam (2005)** conducted a study on the effectiveness of instructional materials in teaching mensuration at secondary level. This study has the objectives to find out the effectiveness of instructional materials in teaching mensuration at secondary level mathematics achievement of boys and girls in content mensuration taught by using instructional materials for experimental and control groups of grades ten. This study found that the performance of the students taught with the use of instructional materials was significantly better than the students taught without the use of instructional materials.

Sharma (2002) conducted research on a study on the availability and use of instructional materials in teaching mathematics of the primary school of Parbat district of Nepal. The objectives of this study were to investigate the availability and use of instructional materials in teaching mathematics at primary level. In this study, twenty-five schools of Parbat School were randomly selected as a sample school. Twenty-five teachers teaching at primary level mathematics were interviewed for the collection of data. Simple percentage reporting was applied to conclude that the availability of the materials was not found very encouraging in most of some materials such as scale, compass, clock model and abacus etc.

**Yadav (2002)** conducted on research on a study on the use of visual aids in instruction of mathematics in the primary school of Dhanusha district. Out of hundred eighty schools, sixty primary schools were selected randomly. One hundred three teachers were selected from sample school. This study found that the trained teachers used teaching aids are frequently that untrained ones and more than 80 percent school lacked the essential teaching aids such as geo-board, geometric and Cubic Square models etc.

**Mitra (2001)** conducted a study on teaching materials and subject wise classroom observation available in CERID/ SRC: A study report submitted to research and development section department of education by management innovation, training and research academy with a view to investigate the availability and utilization of curriculum materials in public primary school' with the research question. How have these curriculum materials used in the classroom, what have been 10 the instructional practices? The research team visited fifty schools and observed on hundred fifty classes of mathematics, social studies and Nepali in each school. This study found that for the primary level, teaching materials are extremely helpful to learn and understand the concept of mathematics, principles theorems formulas etc.

**Upadhyaya (2001)** conducted his study on effect on constructivism on mathematics achievement of grade V students in Nepal. The objectives of this study were to adapt and advocate constructivism in class working on the sample size of 118 students from our schools involving two control and two experimental groups. The research found the possibility of constructivism, in

Nepalese schools with significant difference in achievement that of students in Favor of teaching method based on constructivism approach than conventional method of teaching.

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The above studies had been done to find out whether the achievement of students in mathematics is affected by the variables such as materials, mathematical games, rewards, puzzles etc. or not. These studies become helpful materials for researcher to draw the conclusion of his research work. most of the researches were related to secondary level and this research became only one research related to instructional materials for teaching mensuration at primary level.

**Bondu Raju (2022)** studied about "*A Study of the Effectiveness of the Selfinstructional Material of the Foundation Course in Mathematics"* says that the present study results reveal that, the developed course content reached the target learners those who do not have mathematics at their formal education and those admissions made through Eligibility Test. Over all out of five criterion tests, the reference group showed better performance on three tests, and the experimental group showed better performance on two tests. It reveals that, the developed course content has the internal validity. Thus, it shows that the self-Instructional Course Material in Mathematics is equally

effective with that of the Course Material studied by Intermediate students with Mathematics. The performance of the experimental group [post-test scores] in the achievement test in Mathematics was better when compared with pre-test scores of the distance learners taught through Self- Instructional Course Material. Further, the results show that the self-Instructional Course Material in Mathematics is equally effective when the performance of experimental group was compared with that of the reference group i.e. Intermediate students with Mathematics. The study revealed that, the analysis of the data during the course development reveal that, there is no significant difference on the scores of comprehensive and that of combined criterion tests. It shows that the course content as a whole is effective and students" comprehensive level.

**Adeogun (2001)** revealed a strong positive link between instructional resources and academic performance. According to Adeogun, schools that possess more instructional resources performed better than schools that have less instructional resources. This finding supported the study by Babayomi (1999) that private schools performed better than public schools because of the availability and adequacy of teaching and learning resources. Adeogun (2001) noted that there was a low level of instructional resources available in public schools and hence commented that public schools had acute shortages of both teaching and learning resources. He 19 further commented that effective teaching and learning cannot occur in the classroom environment if essential instructional resources are not available.

**Fuller and Clark (1994**) suggested that the quality of instructional processes experienced by a learner determines quality of education. In their view they suggest that quality instructional materials creat into the learner's quality learning experience. Mwiria (1995) also supports that students performance is affected by the quality and quantity of teaching and learning resources. This implies that the schools that possess adequate teaching and learning materials such as textbooks, charts, pictures, real objects for students to see, hear and experiment with, stand a better chance of performing well in examination than poorly equipped ones.

**Chonjo (1994)** on the physical facilities and teaching learning materials in Primary schools in Tanzania supports the above views. Chonjo interviewed teachers and students on the role of instructional materials on effective learning. From is his study he learned that performance could be attributed to adequate teaching and learning materials and equipments that are in a school. He recommended that in order to provide quality education the availability of sufficient quality facilities is very important. Chonjo's study was one of its kinds in Tanzania which directly linked the role of physical facilities with students' academic performance in primary schools. However, Chonjo focused only on physical facilities, leaving out instructional materials. To me, physical facilities such as buildings including classrooms, chairs and desks are not enough to provide quality teaching and

learning. Instructional 20 materials are also necessary. The study done by Maundu (1987) agrees with my ideas that, in order for a school to have a good performance it must be well equipped with relevant and adequate text books and other teaching and learning resources.

**Abodelraheem & Al-Rabane (2005), Udosen (2011**) and Ibe-Bassey (2012) some creation of improvised media of low technological 24 materials and resource-centred learning can enlarge the limited knowledge base of any course of study and enrich instruction to a guaranteed quality. It can also promote strategies that ensure the integration of technology in the teaching and learning process of basic science education. their findings are in agreement with the findings of Dodge (1997) who observed that using technologies like simulation devices open new horizons for individual learning tools, the environment resources and services.

The use of ICT can also minimize some of the challenges in accessing instructional materials. According to UNESCO (2004), the use and rapid spread of electronic communications has the capacity to affect the quality and efficiency of basic education throughout the world. The ease with which teachers and students can gather information over the Internet on virtually any topic has the potential to transform instructional content and pedagogical practice. Moreover, courses developed by the best teachers in one country can be made available to students across many countries. Newer technology-based instructional strategies, incorporating the Internet and the World Wide Web (WWW), can therefore be used more to expand communication and increase access to resources. Tinio (2002), points out that ICT has potentials in increasing access and improving relevance and quality of education in developing countries. Tinio further states the potentials of ICT as follows: ICTs greatly facilitate the acquisition and absorption of knowledge, offering developing countries unprecedented opportunities to enhance educational systems.

# Chapter-III

# RESEARCH METHODS AND PROCEDURES

# Chapter III

## 3.0 RESEARCH METHODS AND PROCEDURES

This chapter was describing the design, plan and procedure of study. The present research was focus on 'Achievement of student in Mensuration by teaching using and without using teaching materials at grade VIII.

**3.1 Design of the Study** A non–equivalent group, with pre-test, post-test research design (Oak & Feld man,2001) was chosen for this study. This experimental study was based on concept learning approach. This experimental research builds on descriptive data that had been collected in the field.The study was focus in the student achievement by teaching concept learning. This study was based on pretest and post-test model. The design of the study was as follows: Group Pretest Treatment Post-test E1 Teaching by using Instructional materials C1 Teaching without using instructional materials E1 and C1 were pre-test and post-test of experimental group and E1 and C1 were pre-test and post-test of control group respectively. For this study, two groups were making as nearly as possible on the basis of pre- test. Two groups were given an achievement test paper -1 before the treatment was given. With the establishment of two equivalent groups E and C in this design, one group receives the experimental treatment; whereas the other group (control) was receiving usual treatments. The duration of instruction was 15 days, both groups will take achievement test paper –II (Post –test) on the same paper.

### 3.2 Population of the Study

Population of the study was all the students studying in grade, PUMS Nasrathpet, PUMS Thirumazhisai in Tiruvallur district

### 3.3 Sample of the study

The researcher selected only two government schools PUMS Nasrathpet, PUMS Thirumazhisai in Tiruvallur district for the sample of the study. Both of the schools consisted the students of same socio –economic status. Most of them were poor and backward. In grade VIII there were 30 students in PUMS Nasrathpet School consisting of 15 boys and 15 girls students and 30 students in PUMS Thirumazhisai School consisting of 15 boys and 15 girls students were selected for the purpose of this study. Experimental and control groups were determined by tossing a coin. In this way the group of 30 students was an experimental group and the group of 30 students was control group.

**Formation of Control Group and Experimental**

To fulfill the purpose of these study two groups were formed by researcher. For,this researcher administered an achievement test and took interview to the students.Marks obtained by students in pre-test and interview were main factor to determine experimental and control groups.

There were two schools of grade-VIII students in PUMS Nasrathpet, PUMS Thirumazhisai in Tiruvallur district School consisting 44 students in PUMS Nasrathpet, and 77 in PUMS Thirumazhisai. The researcher took 30 interviews of the students of both groups to find out their economic condition, parental education and talent. After taking the interview, the researcher decided to exclude some students by random sampling method. Some students who were irregular also excluded. From remaining students researcher formed two groups, PUMS Nasrathpet, control and PUMS Thirumazhisai experimental, with the help of tossing coin.

## 3.4 Variables

Variables are the conditions or characteristics that the experimenter manipulates, controls or observes. Instructional materials, student's achievement are examples of variables.

**Independent variables**

The independent variables are the conditions or characteristics that the experimenter manipulates or controls in his attempt to ascertain their relationship to observed phenomena. Instructional materials, manipulating materials, teacher are examples of independent variables.

**Dependent variables**

The dependent variables are conditions or characteristics that appear, disappear, removes or changes as the experimenter independent variables. Thus, the dependent variables are the measured changes in pupil performance attributable to the influence of the independent variables. Example students' achievement dependent variable. (Best and Kahn, 2018)

**Control variables**

Controlled variables are variables that an experimenter keeps constant to present confounding with the independent variable. Here the researcher controlled these variables by managing same time duration, same contents, same teacher, and same economic status of the students.

### 3.5 Data Collection Tools

Achievement test paper consisting of objective type questions prepared by the researcher was the main tools used in collecting data for this study. The researcher developed test on the basic of prescribed curriculum and text book of grade VIII on the topic of mensuration. The test consists of knowledge level questions, understanding level questions, skill level questions and problem solving questions. Researcher was intending to compare the student's motivation and their achievement in mathematics between the experimental and control groups.

### 3.6 Achievement test

The pre –achievement test was determined the achievement level of students in both groups. This test was consisting of some questions to be solved. The post achievement test was containing some questions. Post-achievement test was used to measure the students‟ achievement after using instructional materials.

### 3.7 Validity and Reliability

The content validity of the tools and instructional materials was established and approved by mathematics experts as well as school subject teachers. For this purpose researcher administered the test among 14 students of grade VIII of PUMS Varatharajapuram poonamallee block in tiruvallur district. The reliability of the tool and instructional materials was established by using split – half reliability of the test was found 0.40.

### 3.8 Scoring the Data

For the scoring of the data researcher was made different level and types of questions. Each question varied according to difficulty level. Knowledge, understanding, application-level question demand simple information carries 1 mark

### 3.9 Data Collection Procedure

The experimental and control groups were taught by researcher himself 40 minutes per group every day. The experimental group was taught by using instructional materials where as the control group was taught by without using instructional materials. At the end of instruction period, the achievement test was administered to both groups‟ students. The answer sheets was collected and scored by the researcher and then the scores was tabulated for the analysis. The researcher was

collected the data as class observation such as attendance, student's participation, homework and class work of the students. The researcher taught the student with the basic of prepared episodes by researcher himself (See Appendix I).

### 3.10 Data Analysis Procedure

The collected data were analyzed and interpreted by using statistical test by giving critical appraisal using the following procedures. Data were collected from various based on the data collection tools as well as procedures stated at the beginning of this chapter. In this study, the collected data was analyzed by using statistical analysis methods as follows:  Mean, Standard deviation and Variance were calculated in both groups with their obtained marks in the test.  T-test was used at 0.01 level of significance to find where the difference of means statistically significant or not.  The appropriate test of the significance difference between two independent means , t- value was found n1+n2-2 degree of freedom, by using the t-distribution table.  The data obtained from questionnaire for student's teacher were analyzed descriptively.

# Chapter-IV

# ANALYSIS AND INTERPRETATION

*Chapter-IV*

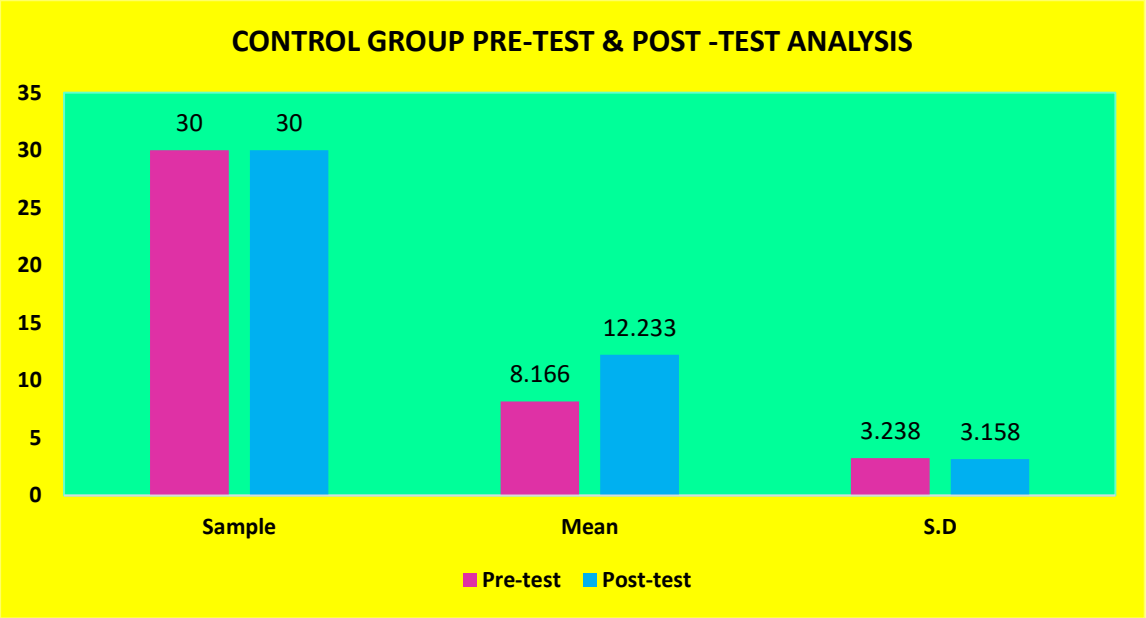
## 4.0 ANALYSIS AND INTERPRETATION

The major objective of the study was to determine the effectiveness of instructional materials in teaching mensuration. Experimental method was adopted to test the effectiveness of instructional materials by comparing with that of traditional method commonly adopted in upper primary school for teaching mathematics. Two groups were selected and study materials were prepared for grade-VIII mathematics. A sample of 30 students from two schools of PUMS Nasrathpet, PUMSThirumazhisai in Tiruvallur district School was selected for the study. Out of 77 students 30 were identified as experimental group and other as control group. The treatment was teaching experimental group using instructional materials and traditional method of teaching in control group. After the experiment, the post test was conducted by administering test prepared by researcher. The statistical analysis of the obtained data is presented in this chapter.

The data of the achievement tests scores were analyzed under the following headings:

- Comparison of pre-test and post –test scores of control group
- Comparison of pre-test and post –test scores of experimental group
- Comparison of experimental and control groups on post-test scores
- . Comparison of post-test scores of boys and girls of experimental group.
- Comparison of control and experimental group boys on post- test score
- Comparison of control and experimental group girls on post- test score
- Comparison of Experimental and Control Groups on Post-test Scores with respect to parent's qualification
- Comparison of Experimental and Control Groups on Post-test Scores with respect to parent's occupation
- Comparison of post-test scores of Tamil medium and English medium students of experimental group.
- Comparison of post-test scores of students of experimental group in area related problems

### 4.1 (i ).Comparison of Control Groups on Pre-test and post-test Scores




The pre-test score and post test scores of pupils of control groups are presented in appendix. The t-test analysis for the comparison of mean achievement scores of pre-test has been presented in table no 1

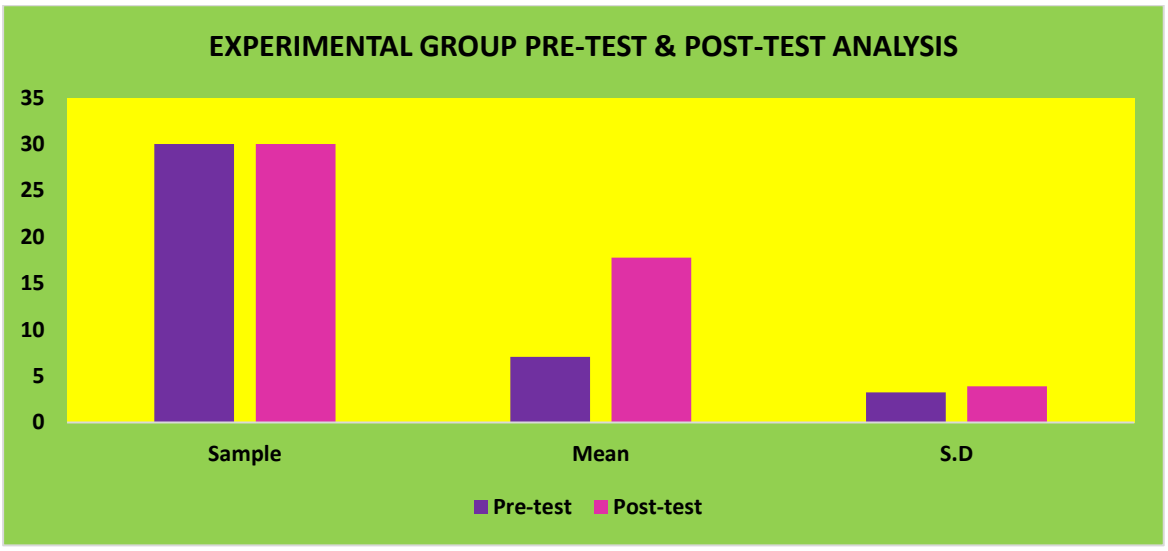
**Table-1**

**Comparison of Pre-test and Post-test Scores of Control group.**

| Variables | Sample | Mean | S.D | T-value |
|---|---|---|---|---|
| Pre-test | 30 | 8.166 | 3.238 | 1.5804 |
| Post-test | 30 | 12.233 | 3.158 | |

Data in table 1 shows that there are 30 students in control group pre test. The mean score obtained by them is 8.166 and standard deviation is 3.238. Similarly, mean and standard deviation of control group are 12.233 and 3.158. At this stage, mean scores are different but standard deviation of control groups of pre test and post test are nearly equal. The table shows that the t-test calculated value **(1.5804)** is less than t-test table value (**1.96**) at 0.05 level of significance. Based on the result, the null hypothesis is accepted at 0.05 level of significance. **There is a no significant difference between students achievement of on pretest and post test scores of control group**

**(ii) Comparison of on Pre-test and post test Scores of Experimental group**




The pre-test and post test scores of pupils of experimental groups are presented in appendix. The t-test analysis for the comparison of mean achievement scores of pre-test has been presented in table no 3

**Table-2**

**Comparison of Pre-test and post- test Scores of experimental group**

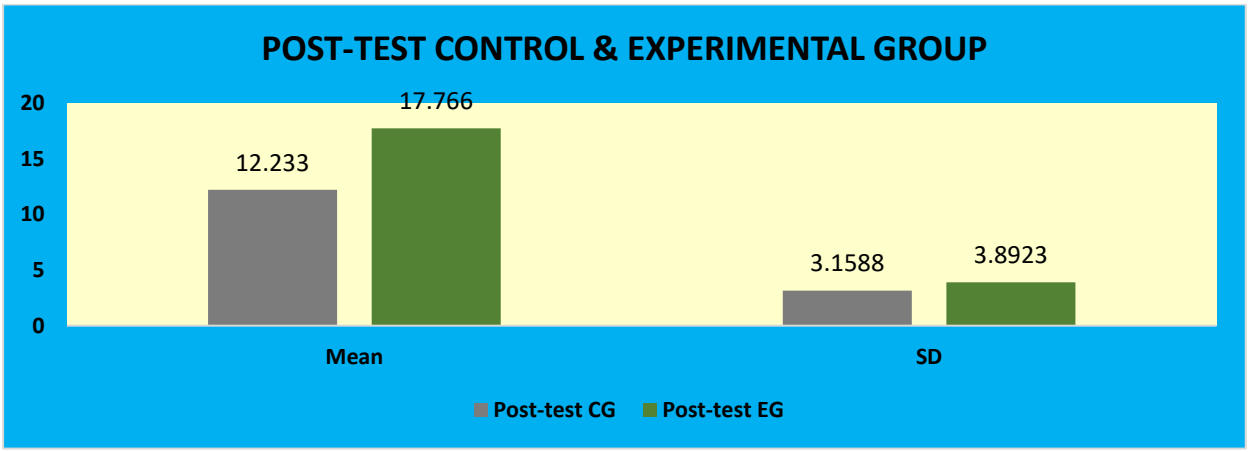
| Variables | Sample | Mean | S.D | T-value |
|---|---|---|---|---|
| Pre-test | 30 | 7.066 | 3.24 | 2.O45 |
| Post-test | 30 | 17.76 | 3.89 | |

Data in table-3 shows that mean and standard deviation of pre test score of experimental group are 7.066 and 3.24. Similarly mean and standard deviation of post- test score of experimental group are 17.76 and 3.89.The difference between mean of experimental and control groups is 10.694.

The table shows that the t-test calculated value **(2.045)** is greater than the t-test table value **(1.96**) at 0.05 level of significance. Based on the result, the null hypothesis is rejected at 0.05 level of significance. The test analysis indicates that the difference in mean is found significant at 0.05 levels. Analysis of the pre-test scores indicates that the groups were comparable at 0.05 level of significance. So, the better performance of experimental group over control group on the post-test scores might have been attributed due to new treatment (i.e. use of instructional materials) given to experimental group

**There is a significant difference between students achievement of on pretest and post test scores of experimental group**

**(iii) Comparison of Experimental and Control Groups on Post-test Scores.**




The post-test was administered to both groups experimental and control after giving treatment. The post-test scores of experimental and control groups have been Presented in appendix and mean, standard deviation and variance have been calculated to calculate t-value.

**Table-3**

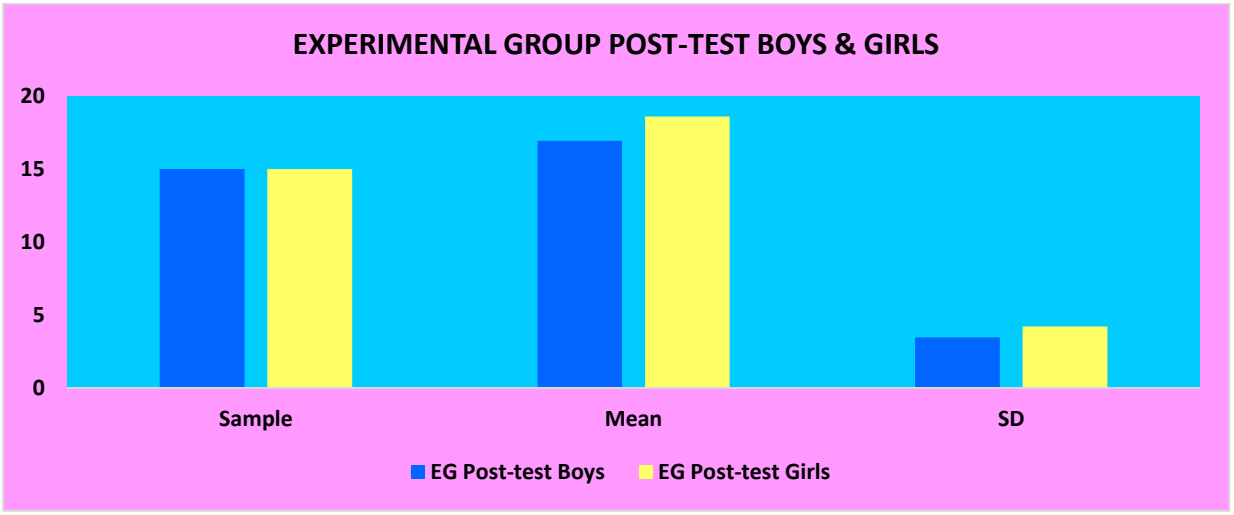
| Variables | Mean | SD | SE | T value | L O S |
|---|---|---|---|---|---|
| Post-test CG | 12.233 | 3.1588 | 0.5767 | 2.015 | 0.05 |
| Post-test EG | 17.766 | 3.8923 | 0.7106 | | |

Data in table-3 shows that mean and standard deviation of experimental group are 17.766 and 3.1588. Similarly mean and standard deviation of control group are 12.233 and 3.1588 The difference between mean of experimental and control groups is 5.53.

The table shows that the t-test calculated value (**2.015**) is greater than the t-test table value (**1.96**) at 0.05 level of significance. Based on the result, the null hypothesis is rejected at 0.05 level of significance. The test analysis indicates that the difference in mean is found significant at 0.05 levels. Analysis of the pre-test scores indicates that the groups were comparable at 0.05 level of significance. So, the better performance of experimental group over control group on the post-test scores might have been attributed due to new treatment (i.e. use of instructional materials) given to experimental group.

**Therefore, there is a significance difference in Comparison of Post-test Scores of Control Group and Experimental Group.**

**(iv) Comparison of Experimental group boys and girls on Post-test Scores.**




The post-test was administered to both boys and girls of experimental after giving treatment. The post-test scores of experimental of boys and girls have been Presented in appendix and mean, standard deviation and variance have been Calculated to calculate t-value

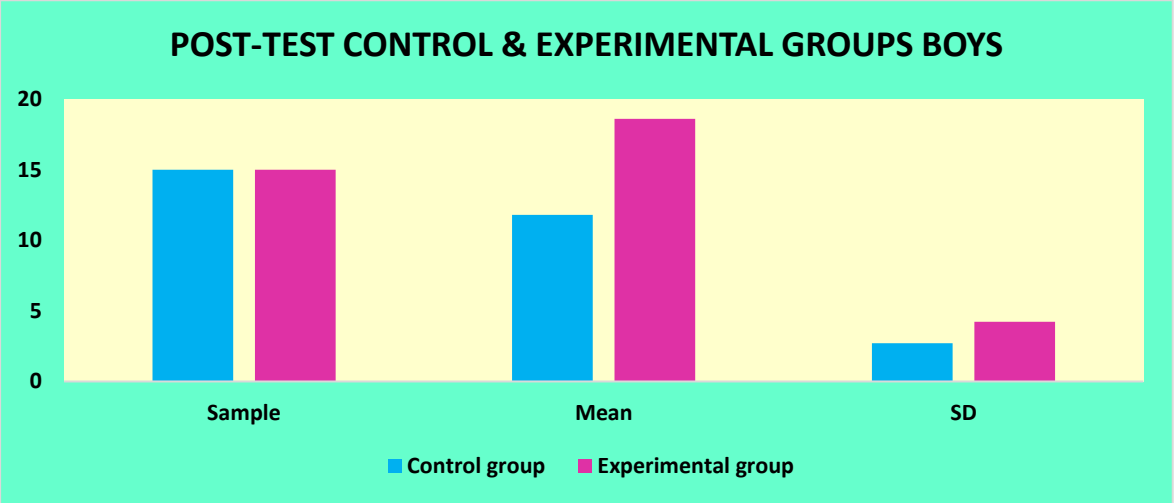
**Table-4**

| Variables | Sample | Mean | SD | SE | T value |
|---|---|---|---|---|---|
| EG Post-test Boys | 15 | 16.93 | 3.47 | 0.89 | 0.76 |
| EG Post-test Girls | 15 | 18.6 | 4.22 | 1.09 | |

Data in table-4 shows that mean and standard deviation of post test score of experimental group of boys are 16.93 and 3.47. Similarly mean and standard deviation of post- test score of experimental group girls are 18.6 and 422.The difference between mean of experimental and control groups is 0.2 The table shows that the t-test calculated value (**0.76**) is less than the t-test table value **(1.96)** at 0.05 level of significance .Based on the result, the null hypothesis is accepted at 0.05 level of significance. The test analysis indicates that the difference in mean is found significant at 0.05 level. Analysis of the pre-test scores indicates that the groups were comparable at 0.05 level of significance.

**Therefore, there is a no significance difference in Comparison of Experimental group boys and girls on Post-test Scores.**

**(v) Comparison of Control and Experimental group boys on Post-test Scores.**



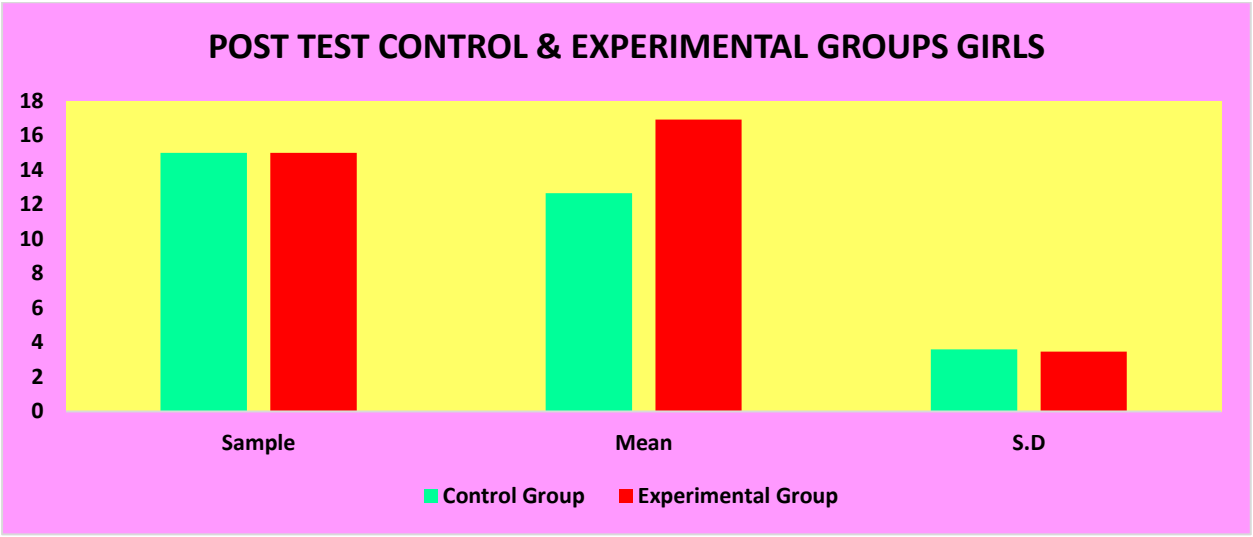

The post-test was administered to both boys of experimental and control group after giving treatment to experimental group. The post-test scores of control group of boys and experimental group of boys have been presented in appendix and mean; standard deviation and variance have been calculated to calculate t-value.

**Table-5**

| Variables | Sample | Mean | SD | T value | L o S |
|---|---|---|---|---|---|
| Control group | 15 | 11.8 | 2.704 | 2.1447 | 0.05 |
| Experimental group | 15 | 18.6 | 4.222 | | |

Data in table-5 shows that mean and standard deviation of post test score of control group of boys are 11.8 and 2.704. Similarly mean and standard deviation of post- test score of experimental group boys are 18.6 and 4.222.The difference between mean of experimental and control groups is 1.518 The table shows that the t-test calculated value **(2.1447 )** is greater than the t-test table value **( 1.96)** at 0.05 level of significance. Based on the result the null hypothesis is rejected at0.05 level of significance. The test analysis indicates that the difference in mean is found significant at 0.05 levels. Analysis of the pre-test scores indicates that the groups were comparable at0.05 level of significance. **Therefore, there is a significance difference in Comparison of Control and Experimental group boys on Post-test Scores.**

**(vi) Comparison of Control and Experimental group girls on Post-test Scores.**




The post-test was administered to both boys of experimental and control group after giving treatment to experimental group. The post-test scores of control group of boys and experimental group of boys have been presented in appendix and mean, standard deviation and variance have been calculated to calculate t-value.

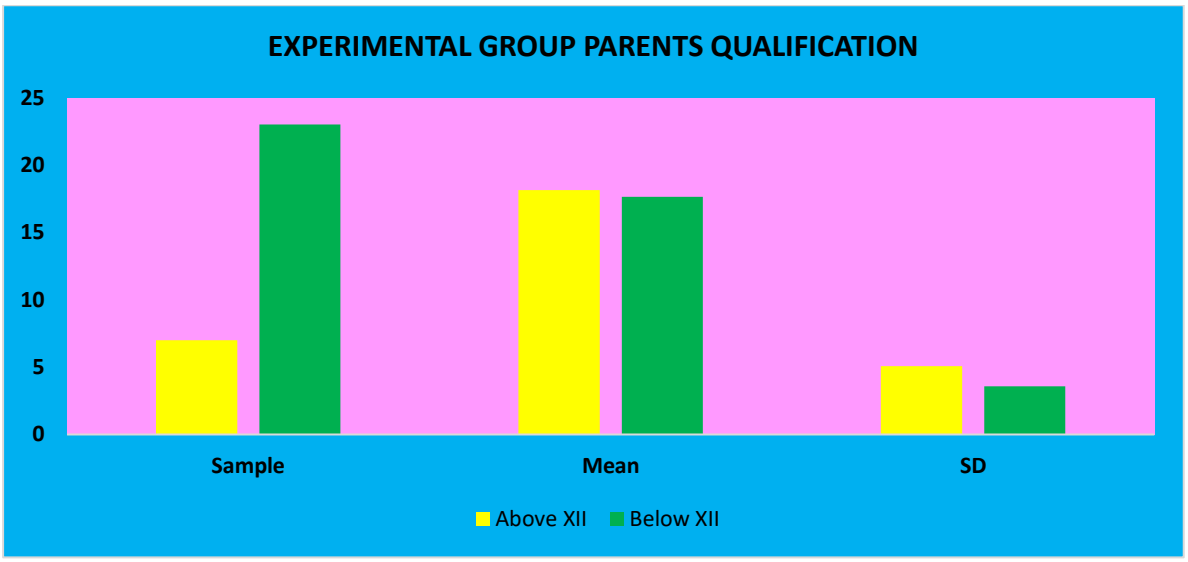
**Table-6**

| Variables | Sample | Mean | S.D | S.E | T value |
|---|---|---|---|---|---|
| Control Group | 15 | 12.66 | 3.598 | 0.896 | 2.005 |
| Experimental Group | 15 | 16.93 | 3.473 | | |

Data in table-6 shows that mean and standard deviation of post test score of control group of girls are 12.66 and 3.598. Similarly mean and standard deviation of post- test score of experimental group girls are 16.93 and 3.473 the difference between mean of experimental and control groups is 4.27 the table shows that the t-test calculated value **(2.005)** is greater than the t-test table value **(1.96)** at 0.05level of significance. Based on the result, the null hypothesis is rejected at 0.05 level of significance. The test analysis indicates that the difference in mean is found significant at 0.05 levels. Analysis of the pre-test scores indicates that the groups were comparable at 0.05 level of significance.

**Therefore, there is a significance difference in Comparison of Control and Experimental group girls on Post-test Scores**

**(vii) Comparison of Experimental group Post-test Scores with respect to parent's qualification.**




The post-test was administered to both groups experimental and control after giving treatment. The post-test scores of experimental and control groups have been Presented in appendix and mean, standard deviation and variance have been Calculated to calculate t-value

**Table-7**

| Variables | Sample | Mean | SD | SE | T value | L o S |
|---|---|---|---|---|---|---|
| Above XII | 7 | 18.14 | 5.08 | 1.92 | 0.2381 | 0.05 |
| Below XII | 23 | 17.65 | 3.58 | 0.74 | | |

Data in table-7 shows that mean and standard deviation of experimental group parent's qualification above 12 standards are 18.14 and 5.08. Similarly mean and standard deviation of experimental group parent's qualification below 12 standards are 17.65 and 358 the difference between mean of experimental and control groups are 0.49. The table shows that the t-test calculated value **(0.2381)** is less than the t-test table value **(1.96)** at0.05 level of significance. Based on the result the null hypothesis is accepted at 0.05 level of significance. The test analysis indicates that the difference in mean is found significant at 0.05 levels. Analysis of the pre-test scores indicates that the groups were comparable at 0.05 level of significance.

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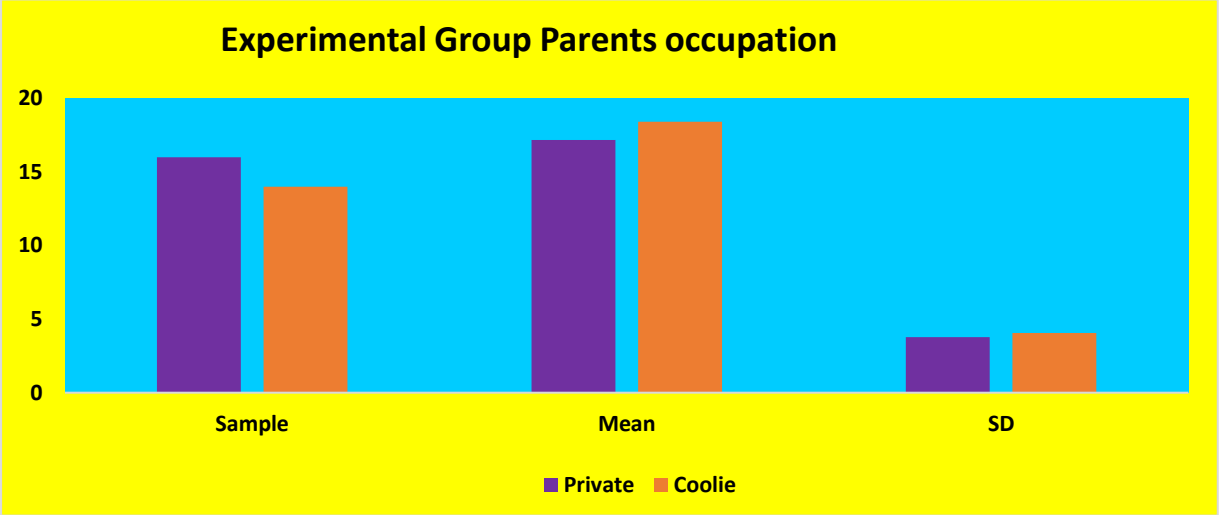
**Therefore, there is a no significance difference in Comparison of Experimental Groups on Post-test Scores with respect to parent's qualification**

**(viii) Comparison of Experimental group Post-test Scores with respect to parent's occupation private and coolie.**




The post-test was administered to both groups experimental and control after giving treatment. The post-test scores of experimental and control groups have been Presented in appendix and mean, standard deviation and variance have been Calculated to calculate t-value

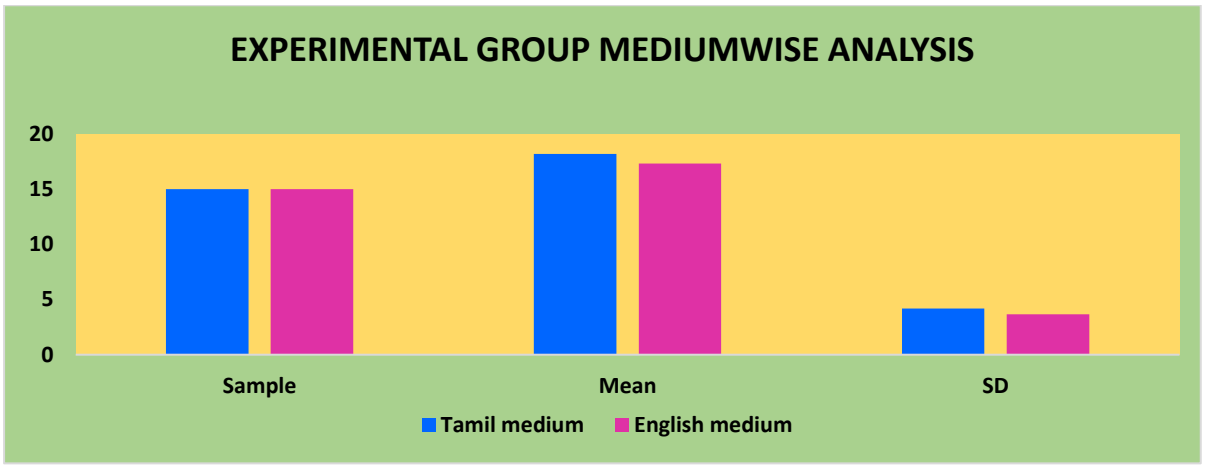
**Table-8**

| Variables | Sample | Mean | SD | SE | T value | L o S |
|---|---|---|---|---|---|---|
| Private | 16 | 17.18 | 3.78 | 0.945 | 1.703 | 0.05 |
| Coolie | 14 | 18.42 | 4.05 | 1.082 | | |

Data in table-8 shows that mean and standard deviation of experimental group parent's occupation private are 17.18 and 3.78. Similarly mean and standard deviation of experimental group parent's occupation coolie are 18.42 and 4.05 the difference between mean of experimental and control groups are 1.24. The table shows that the t-test calculated value **(1.703)** is less than the t-test table value **(1.96)** at 0.05 level of significance. Based on the result the null hypothesis is accepted at 0.05 level of significance. The test analysis indicates that the difference in mean is found significant at 0.05 levels. Analysis of the pre-test scores indicates that the groups were comparable at 0.05 level of significance..

**Therefore, there is a no significance difference in Comparison of Experimental and Control Groups on Post-test Scores with respect to parent's occupation**

**(ix) Comparison of Experimental group Post-test Scores with respect to medium**




The post-test was administered to both Tamil medium students of experimental group and English medium students of experimental group after giving treatment to experimental group. The post-test scores of Tamil medium English medium students and English medium students have been presented in appendix and mean, standard deviation and variance have been calculated to calculate t-value.

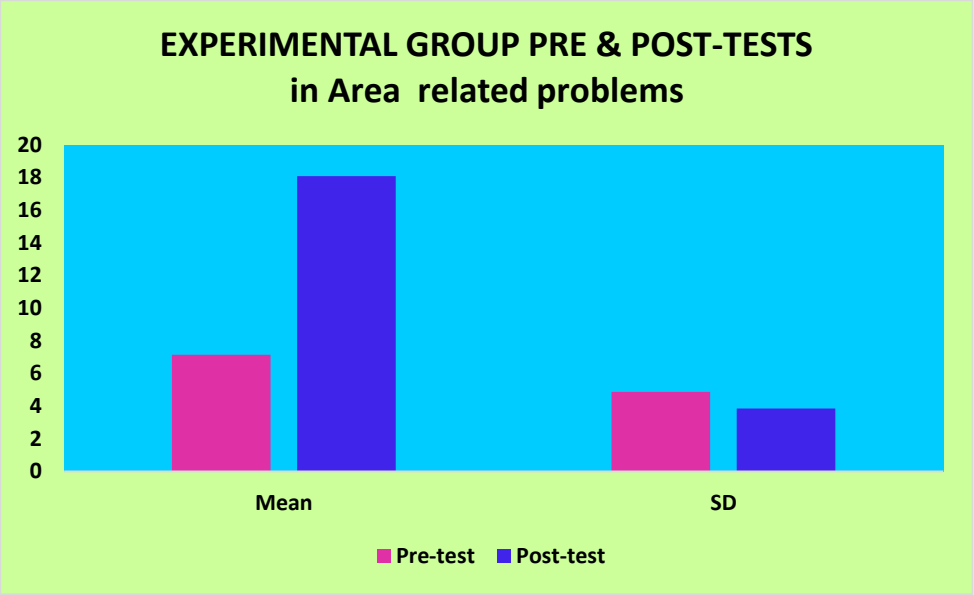
**Table-9**

| Variables | Sample | Mean | SD | SE | T value |
|---|---|---|---|---|---|
| Tamil medium | 15 | 18.2 | 4.17 | 1.07 | 0.063 |
| English medium | 15 | 17.33 | 3.67 | 0.94 | |

Data in table-9 shows that mean and standard deviation of post test score of Tamil medium are 18.2 and 4.17. Similarly mean and standard deviation of post- test score of English medium group girls are 17.33 and 3.67 the difference between mean of experimental and control groups is 0.87 The table shows that the t-test calculated value **(0.063)** is less than the t-test table value **(1.96)** at 0.01 level of significance. Based on the result the null hypothesis is accepted at 0.05 level of significance. The test analysis indicates that the difference in mean is found significant at 0.05 levels. Analysis of the post-test scores indicates that the groups were comparable at 0.05 level of significance.

**Therefore, there is a no significance difference in Comparison of Experimental group Post-test Scores with respect to medium**

**(x) Comparison of Experimental group Post-test Scores with respect to Area related problems**




The post-test was administered students of experimental group after giving treatment to experimental group. The post-test scores of students in area related problems have been presented in appendix and mean, standard deviation and variance have been calculated to calculate t-value

**Table-10**

| variables | Mean | SD | T value | L.S |
|---|---|---|---|---|
| Pre-test | 7.1538 | 4.8793 | 2.1207 | 0.05 |
| Post-test | 18.0769 | 3.8613 | | |

Data in table-10 shows that mean and standard deviation of pre- test score of Area related problems 7.153 and 4.87. Similarly mean and standard deviation of post- test score of Area related problems are 18.076 and 3.861 The difference between mean is 10.923 The table shows that the t-test calculated value **(2.1207)** is greater than the t-test table value **(1.96)** at 0.05 level of significance. Based on the result the null hypothesis is rejected at 0.05 level of significance the test analysis indicates that the difference in mean is found significant at 0.05 levels. Analysis of the post-test scores indicates that were comparable at 0.05 level of significance.

**Therefore, there is a significance difference in Comparison of Post-test Scores with respect to Area related problems**

**Students Feeling While Teaching With Materials**

Qualitative analysis is made on the basis of observation of students by researcher in their classroom activities. Observation is a kind of tool that helps to seek information and knowledge through the use of sense organs. Etymologically, observation could be understood as the act of watching somebody/something carefully for a period of time, especially to learn something. In the research work, observation is an effective and suitable method for reliable primary data collection tools. On the basis of classroom instruction the researcher observed the students activities and noted them daily on his notebook which gives a glimpse of the enthusiasm of students of experimental group. Researcher noted mainly streams of students' activities, their feelings and attendance from observation of class room. The researcher also noted about activeness of student, participation in class room activities, regularity and problem solving capacity. During the experimental period researcher found that every students of experimental group were curious and interested to learn. All the students of experimental group were listening silently and participated in group activities actively. They were feeling easy for learning mathematics. On the other hand, researcher found that his teaching was not effective in control group because students of that group were not interested and curious to learn. They were feeling bore and difficult to learn. They were not excited to learn mathematics. They did not take mathematics as interesting subject. They frequently complained that mathematics is very difficult subject even they used to say ' I can't do well in mathematics. There was a vast difference in talent and weak students. Only the talent students participated in the classroom activities. They often sat on the front row of the classroom but the weak students rarely participated in classroom activities, they often sat on the last row. They did not do their homework and class work regularly. The attendance rate of control group was lower than experimental group. Most of students in control group were passive in learning activities so the teacher had to do more exercise in such class rather than students. In summary, most of the students of control group were inactive, not laborious and not concentrated. Very weak performance of students was observed. The students of control group did not interact with each other and even with the teacher. Only few students of control group were serious for their study.

Here, one episode is given. It was the observed class of experimental group.

**Episode**

Researcher entered his classroom. All the students were happy. They were waiting for his class 30 students were present. Environment of classroom was good.He started his lesson area and volume of cube by showing model of cube and die. He wrote area of cube = sum of area of all

faces. He asked some questions to the students. What is the shape of the face of cube? How many faces does a cube have? All the students were curious to find out the answers. They were interested and curious to learn. No one was lazy. According to the answers given by them, he completed this as: area of cube = $6a^2$. Showing the formulas chart, he clarified the students about the formulas. At that time, they were feeling easy and saying that they solved problems related to area and volume of cube easily. Students were involved in problem solving actively .They were motivated. Most of students did the problem without hints. Some were helping their friends to complete the problem. In this way, researcher completed his observation class. At last, he gave some problems related to cube for homework. Finally, researcher found that students were participating actively in learning activities. They were encouraged to solve the answer of given questions. Researcher and students interaction was friendly, interesting and students were participating in all the classroom activities. They attained the class regularly. It was also found that the systematic use of materials can have profound effects on the role of teacher in teaching learning process. On the basis of the classroom instruction, the teacher observed that the use of instructional materials in teaching mathematics concept was found motivating and interesting to facilitate for active participation in the classroom activities. On the other hand, teaching without using materials was less interesting and motivating to clarify the mathematical concepts. It was also difficult to activate the students as well as create the interest in the problem. To analyze the responses of students, the researcher conducted the interview of half an hour for them. Researcher asked following questions and collected the answer given by them.

Researcher asked to students, "What did you feel when I taught you using
Instructional and without using instructional materials".
*Student A replied, "Teaching with instructional materials is easy than traditional methods."*
*Student B replied, "I felt learning became interesting."*
*Student C replied, "Instructional materials helped to all students to Understand subject matter."*
*Student D replied, "I understood this lesson easily."*
*Student E replied, "All the classes were interesting."*
Similarly, other some related questions were asked and students expressed positive view toward the use of instructional materials in teaching mathematics. Hence, from the above information obtained from classroom observation and views of students about instructional materials, researcher found that instructional materials facilitate students to participate in classroom activities, to be regular in

class and to interact with teacher. On the other hand, teaching without materials was less effective. Students of that group were not interested, and less active for learning mathematics. So, instructional materials are effective in teaching mensuration at Upper primary level.

# Chapter-V

# SUMMARY, FINDINGS, CONCLUSION

*Chapter-V*

# SUMMARY, FINDINGS, CONCLUSION AND RECOMMENDATIONS

The main purpose of this study was to find out the effectiveness of instructional materials while teaching mensuration at primary level. This study was intended to answer the question whether the use of instructional materials yields better result of students than without using it while teaching mensuration at upper primary level.

## 5.0 Summary

A pre-test, post-test equivalent groups design was adopted as the design of the study. Grade-Eight students of PUMS Nasrathpet, PUMSThirumazhisai in Tiruvallur district at poonamalle , 30 students were chosen for the study. In two schools, 1st school was taken as control and 2nd school as experimental groups, were made homogeneous on the basis of pre-test result. The researcher taught both groups experimental and control same selected unit following the lesson developed by the researcher. Experimental group was taught by using instructional materials and control group without using materials. Two weeks time period was given to both groups. At the end of teaching a post-test was administered on both groups. The pretest, post-test non-equivalent group design was adopted for the purpose of the study. Mean S.D. and variance were calculated in both groups with the help of their obtained marks. T-test was applied in order to compare the mean difference between two groups. The data were analyzed and interpreted statistically to find the conclusion.

## 5.1 Findings

The result of pre-test indicated that there was no significant difference on the pre-test scores of both groups. But the result of the post-test indicated that there was significant difference in achievement at specified level in favour of experimental group. T-test was used to compare mean scores of experimental groups and control groups on pre-test. The result of the test indicated that there was no significant difference between the groups at 0.01 level of significance. But the result of post-test indicated that there was significant difference in mean achievement score of experimental and control groups. Similarly there was no significant difference in mean achievement scores of boys and girls of experimental group on pre-test scores as well as post-test scores. But there was significant difference in mean achievement scores of girls of experimental group on pre-test and post-test scores. On the case of qualitative analysis, researcher found that all the students were curious to learn mathematics in experimental group. They were feeling easy and interesting. But the

students of control group were not curios and interested to learn. They were feeling bore and difficulty to learn. Class teacher and students of experimental group were given positive attitude towards the use of instructional materials at primary level.

The following results are found in my research:

**1. There is no a significant difference between students achievement of on pretest and post test scores of control group**

**2. There is a significant difference between students achievement of on pretest and post test scores of experimental group**

**3. There is a significance difference in Comparison of Post-test Scores of Control Group and Experimental Group.**

**4. There is a no significance difference in Comparison of Experimental group boys and girls on Post-test Scores**

**5. There is a significance difference in Comparison of Control and Experimental group boys on Post-test Scores**

**6. There is a significance difference in Comparison of Control and Experimental group girls on Post-test Scores**

**7. There is a no significance difference in Comparison of Experimental Groups on Post-test Scores with respect to parent's qualification**

**8. There is a no significance difference in Comparison of Experimental Groups on Post-test Scores with respect to parent's occupation**

**9. There is a no significance difference in Comparison of Experimental group Post-test Scores with respect to medium**

**10. There is a significance difference in Comparison of Post-test Scores with respect to Area related problems**

### 5.2 Recommendations

Followings are the some recommendations and suggestions for the improvement of the teaching situation at primary level classes.

- Concrete materials should be used while teaching mathematics at upper primary level.
- Mathematics teacher should be encouraged to use materials in teaching mathematics

- Training should be provided for untrained teacher.
- Mathematics teachers should be made to ensure that the instructional materials

are relevant to the mathematics concepts that they will be used.

### 5.3 Conclusion

Instructional materials are very important for mathematics teaching. If teacher promotes instructional materials to make clear concept about lesson, the achievement of students increase. So, it can conclude that the method of teaching at upper primary level should be changed to increase students' achievement in mathematics.

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## Appendix-A

## Teaching Episodes-1

Subject: Mathematics Class: VIII

Unit: Mensuration Date:

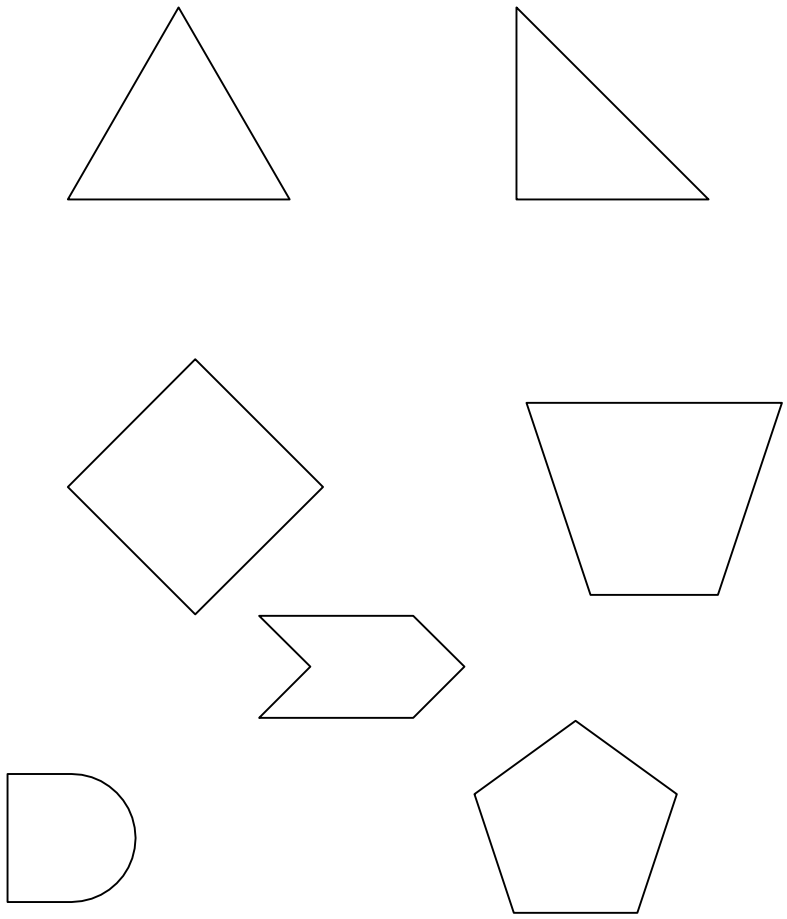
Mensuration deals with the measurement of area, perimeter, surface area and volume of different types of shapes

Let us know the area of all two-dimensional shapes.

| **Shape** | **Area** |
|---|---|
| Rectangle | a × b |
| Square | a × a |
| Triangle | ½ b × h |
| Parallelogram | b × h |
| Circle | $\pi r^2$ |

1. Specific Objectives: At the end of the lesson students will be able to
   I. Define triangle and quadrilateral.
   II. Find the right figure of triangle and quadrilateral.
2. Teaching materials: cardboard model of triangles quadrilaterals and other polygons.
3. Teaching procedures and activities:
   a) The teacher provides different models of triangles, quadrilateral and other polygons and let the students to discuss on it. Ask them to know, which is triangle, quadrilateral, and other polygons.
   b) Give some clues and collect all the responses from students.
   c) Draw the some polygons on board and let them to discuss.

For example:



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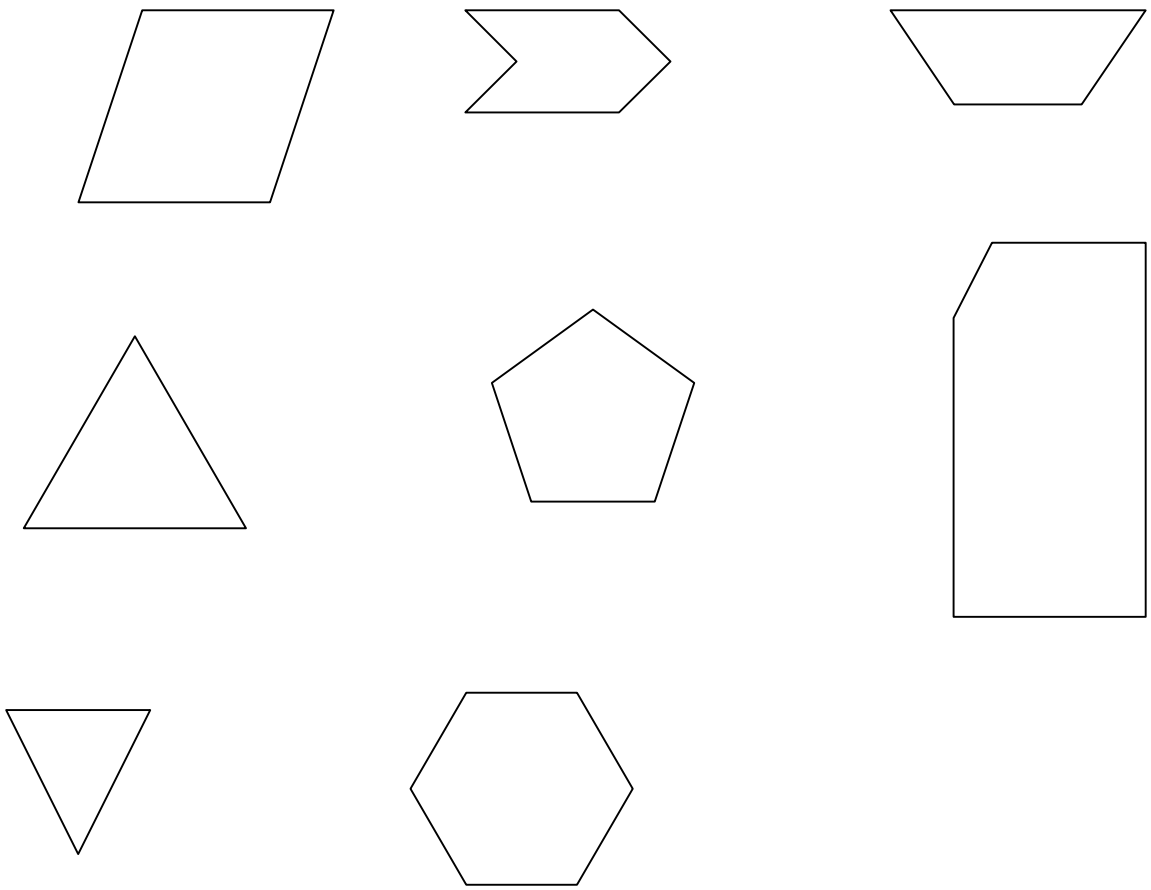
d) After discussing about the models and figures, definition of triangle and quadrilateral will be made in class.

4. Evaluation: Which of the following figures are of triangles and quadrilaterals?



5. Homework: i) Write the definition of triangle and quadrilateral.

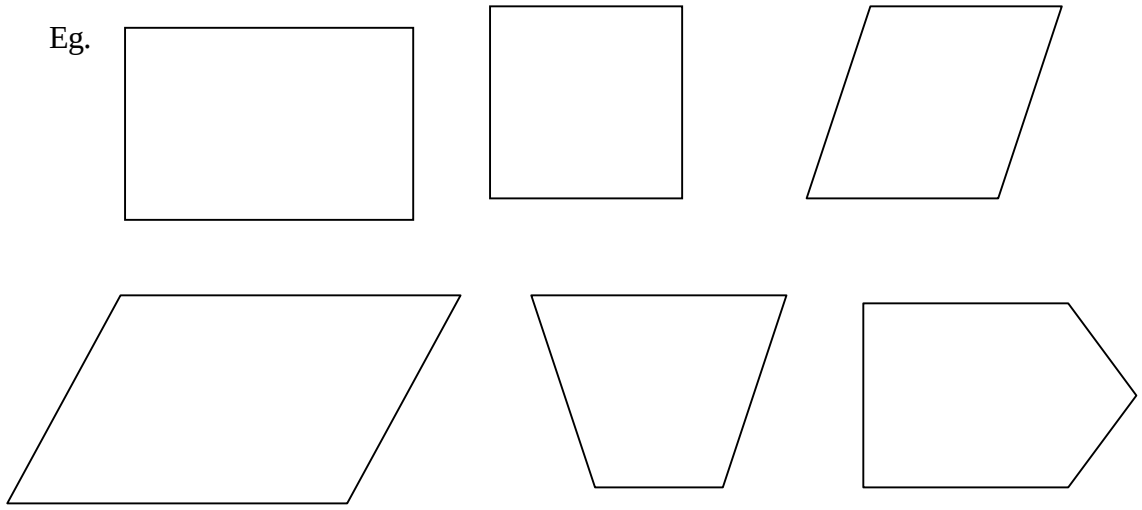
**Teaching episode-2**

Subject: Mathematics Class: VIII

Topic: Rectangle and square Date:

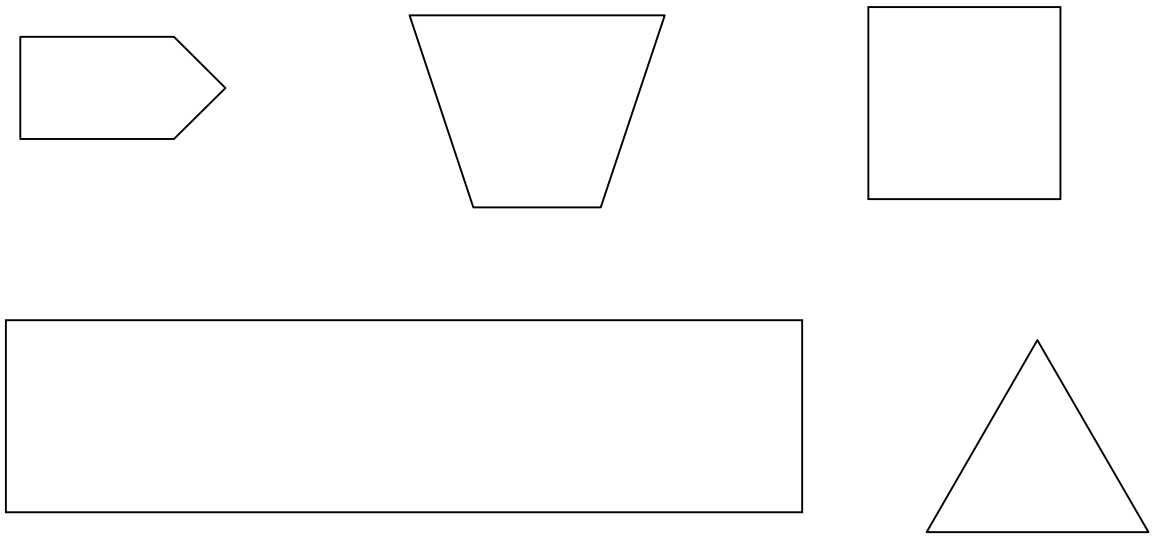
1) Specific objectives: At the end of the lesson students will be able to
   a) Define rectangle and square.
   b) Find the right figures of rectangle and squares.
2) Teaching materials: Cardboard model of rectangle and square.
3) Teaching Procedures and activities:
   a) By providing models, teacher starts his lesson and discusses about them.
   b) Ask them about rectangle and square.
      How do you define rectangle?
      How do you define square?
   c) Let them to discuss about rectangle and square. Ask them to measure length of opposite sides and all angles of models. Ask the students individually about the measures of models.
   d) After that, collect all the responses of the students and draw the conclusion.
   e) Drawing some figures on the board let them to discuss in group.
   f) Ask the following questions.
      Which one is rectangle?
      Which one is square?

Eg.



g) Collect all the responses given by them. If they are still confuse make clear them by giving some other example.

4) Evaluation:
   a) What is rectangle?
   b) What is square?
   c) Find the right figures of rectangle and square.



5) Homework:
   a) Write the definition of rectangle square and quadrilateral.

**Teaching episode-3**

Subject: Mathematics Class: VIII

Topic: Perimeter of polygon (triangle, quadrilateral, pentagon etc) Date:

1) Specific objective: At the end of the lesson students will be able to find the perimeter of given figures.
2) Teaching materials: Cardboard model of triangles quadrilaterals and polygons.
3) Teaching procedures and activities:

a) Provide model of polygon to the students. Clarify the students about perimeter of polygons. For that, ask them to measure boundaries of polygon. If they found ask them to sum all boundaries. If not tell them to measure the way to measure the boundaries of polygon.

b) Draw the conclusion about the perimeter of polygon with the help of the above discussion.

The length of boundaries of a closed figure is called its perimeter.

Perimeter of polygon = sum of length of all sides.

c) Discuss about other more examples.

Example: find the perimeter of triangle having sides 3cm 4cm and 5cm.

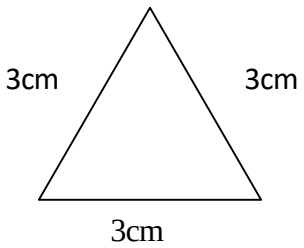
We know that, perimeter of triangle = sum of all sides

= 3cm+ 4cm+ 5cm

= 12cm

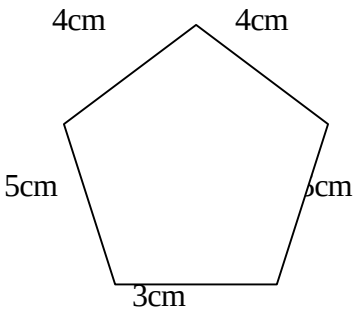
4) Evaluation :

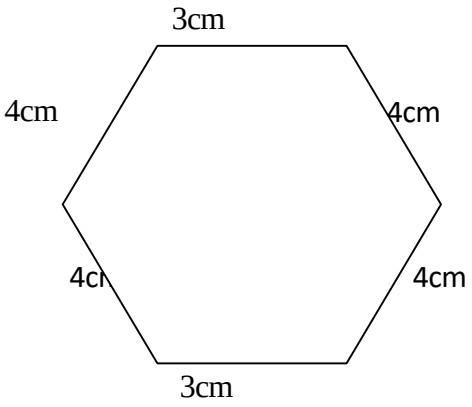
a) Find the perimeter of given triangle.



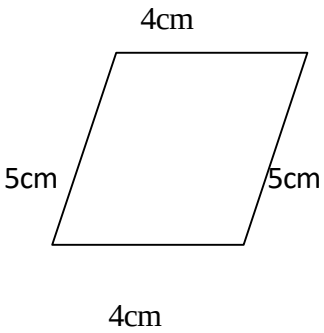
b) Find the perimeter of given figures

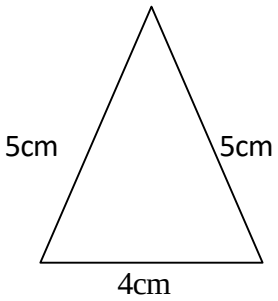
.




5) Homework: Find the perimeter of the following figures



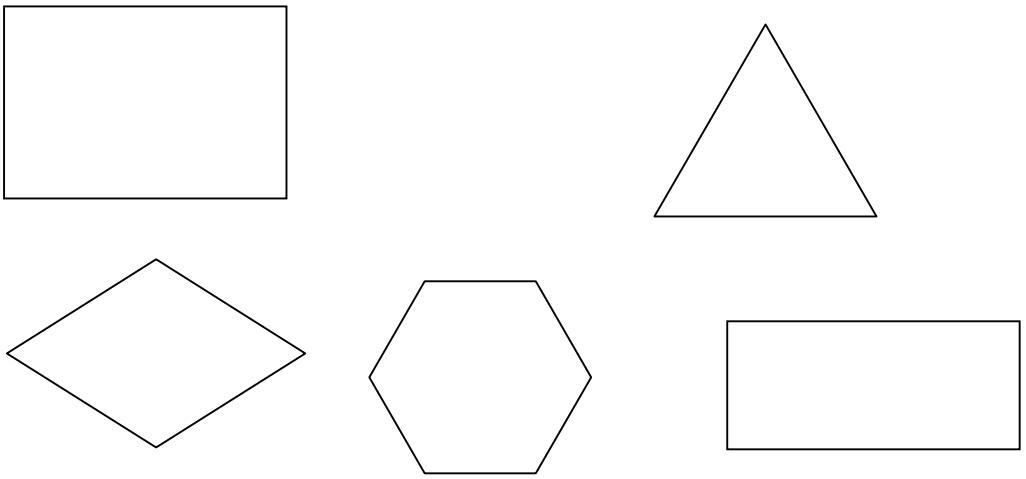
**Teaching episode-4**

Subject: Mathematics Class: VIII

Topic: Perimeter of rectangle Date:

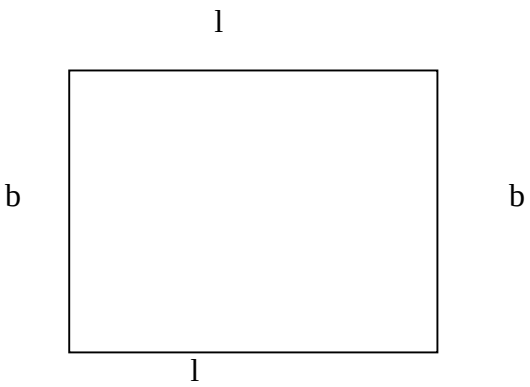
1) Specific objective: on completion of lesson students will be able to find the perimeter of rectangle.
2) Teaching materials: cardboard model of rectangle and formula chart.
3) Teaching activities:

a) By drawing some figures on board, ask to students to know the correct figures of rectangle.



b) Showing materials, discuss about the formula of perimeter.

Example:




Perimeter of polygon: length of boundaries

= l+ b+ l+ b

=2l+ 2b= 2(l+ b)

c) Giving one example, discuss to find the perimeter of rectangle.

Example: Find the perimeter of rectangle having length 5cm and breadth 4cm.

Here, length and breadth of rectangle is denoted by l and b.

Then (l) = 5cm

(b) = 4cm

We know that perimeter of rectangle is denoted by p and

P = 2 ( l+ b )

= 2 ( 5cm + 4cm )

= 2 ( 9 cm )

= 18 cm

d) Teacher can discuss about other example.

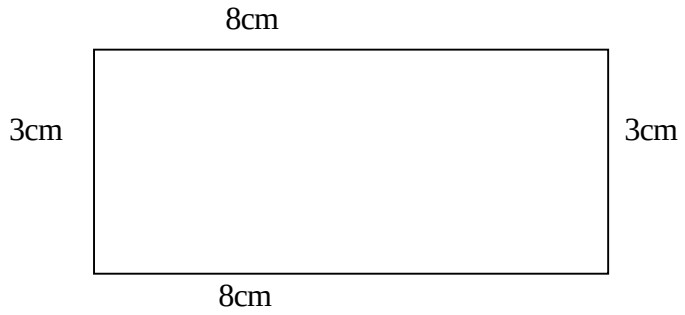
4) Evaluation:

a) What is the formula of perimeter of rectangle?

b) What is the perimeter of rectangle having length 20 cm and breadth 10 cm?

5) Homework:

a) Find the perimeter of rectangle given in the figure.




a) What is the length of rectangle if perimeter and breadth are 18 cm and 4cm ?

**Teaching episode-5**

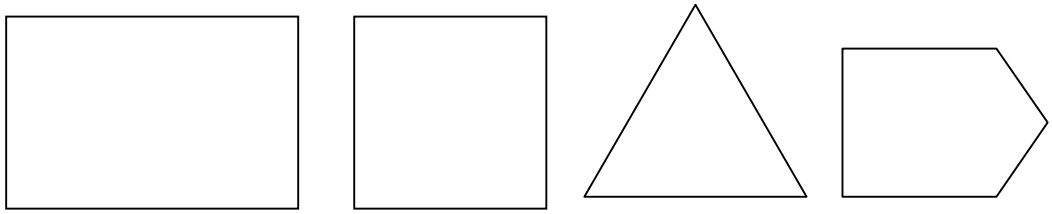
Subject: Mathematics class: VIII

Topic: Perimeter of square date:

Specific objective: At the end of the lesson the students will be able to find the perimeter of square.

Teaching materials: formulas chart

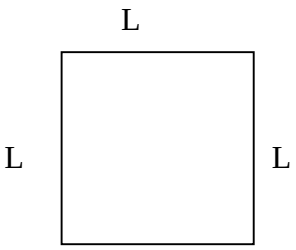
Teaching activities: a) Ask the students to know the correct figures of square. Give some hints, if they don't find.



b) Discuss about the formula of perimeter of square.

Perimeter= L + L+ L+ L

= 4L




( all sides of a square are equal )

c) Discuss about the process to find the perimeter.

Example: Find the perimeter of square having length 10 cm.

Here, length of square is denoted by L and its perimeter by P

Then, L = 10 cm

P = ?

We know that P = 4L

$=4\times10$ cm

$= 40$ cm

d) Discuss about some other examples.

Evaluation:

a) What is the formula to find the perimeter of square?
b) What is the length of square if perimeter is 80 cm?

Homework:

a) Find the perimeter of square of length 5.4 cm.
b) Find the length of square if perimeter is 80 cm.

**Teaching episode-6**

Subject: Mathematics Date:

Topic: Area of rectangle and square Class: VIII

Specific objectives: At the end of the lesson the students will able to

a) Find the area of rectangle.
b) Find the area of square.

Teaching materials: Formulas chart

Teaching activities:

a) Discuss about the characteristics of square and rectangle.
   Opposite sides of rectangle are equal. Do you know about the sides of square?
   Ask them about the angular relation of the square and rectangle.

b) By showing formulas chart, clarify them about formulas.
c) Discuss about the process to find out the area of square and rectangle.
   Find the area of rectangle having length 8cm and breadth 5cm.
   Here, length, breadth, and area if rectangle are denoted by the letter l, b, and a
   Then, l = 8cm
   b = 5cm
   a =?
   Ask the students to say the correct formula of area of rectangle. Collect the responses of some students. If they unable to say, again by showing chart tell about formula. Let them to complete this problem

d) Let them to do some example.
   Find the area of square having length 10cm.
   What is the length of square, if its perimeter is 20cm?
   Find the area of rectangle of length 20cm and breadth 11cm.

Evaluation:

a) Which formula can we apply to find the area of rectangle?
b) Which formula can we apply to find the area of square?

Homework:

a) Find the area of rectangle having length and breadth 10 cm and 8 cm.
b) Find the area of square of 8 cm length.
c) If the area of square is 100 $cm^2$, then find its length.
d) If the area and breadth of rectangle are 60 $cm^2$ and 5 cm, then find its length.

## Teaching episode-7

Subject: Mathematics Date:

Topic: Cuboid Class: VIII

Specific objectives: at the end of the lesson the students will be able to

a) Recognize the cuboid.
b) Say the number of faces, vertices of cuboid.

Teaching materials: Model of cuboid chalkbox etc.

Teaching activities:

a) Ask some questions from previous lesson.
   What is the formula of area of square?
   Which formula can we use to find the area of rectangle?
b) Showing model and chalkbox, discuss about shape, faces, vertex, and edges of cuboid.
   Ask them to count the faces of cuboid.
   Ask them to count edges and vertices.

c) Let them to measure length and breadth of each faces.
d) Make clear concept about cuboid.

Evaluation:

a) How many faces does a cuboid have ?
b) Tell the total number of faces, edges, and vertices of a cuboid?

**Teaching episode-8**

Subject: Mathematics Date:

Topic: Cube Class: VIII

Specific objectives: At the end of the lesson the student will be able to

a) Find out the right figure of cube.
b) Tell the number of faces, edges, and the vertices of a cube.

Teaching materials: Model of cube, Die etc.

Teaching activities:

a) By showing model of cube, chalkbox and die, ask them to differentiate among them.
b) Make clear them about number of faces, edges, and vertices of cubes.
   By giving model of cube, ask them to count faces edges and vertices. Teacher can guide to count them. Collection of responses will be made at the end of the discussion. Those who will be unable to say, teacher can treat them individually.
c) Discuss about the shape of each faces of cube.

Evaluation:

a) How many faces does a cuboid have?
b) Say the total number of edges and vertices of cuboid

**Teaching episode-9**

Subject: Mathematics Date:

Topic: Surface area and volume of cuboid Class: VIII

Specific objectives: At the end of the lesson students will be able to

a) Find the area of cuboid.
b) Find the volume of cuboid.

Teaching materials: Model of cuboid, formulas chart

Teaching activities:

a) Discuss about the formulas of surface area and volume of cuboid

For example: Total number of faces of cuboid are 6 and each faces is of rectangular shape.

Therefore area of cuboid = Area of six faces

= lb+ lb+ lh+ lh+ bh+ bh

= 2lb+ 2lh+2bh

= 2( lb+ lh+ bh )

b) Discuss about the process to find out the area and volume of cuboid.

c) Let them to do some examples.

For example: find the total surface area of cuboid having 5cm, 4cm, and 3cm length, breadth, and height.

Here, l = 5cm
b = 4 cm
h = 3cm
s = ?

We know that

S = 2 (lb + lh +bh )

(Ask this formula to the students)

= 2 (  )

(Ask to complete this blank. Let them to discuss it. )

Evaluation:

a) Which formula can we use to find the surface area of cuboid?
b) Which formula is applicable to find the volume of cuboid?

Homework:

a) Find the total surface area of cuboid having length 5cm breadth 4 cm and height 4 cm.
b) Find the volume of cuboid having length 10 cm breadth 8 cm and height 4 cm.

**Teaching episode-10**

Subject: mathematics Date:

Topic: surface area and volume of cube Class: VIII

Specific objectives: At the end of the lesson the students will be able to

a) Find the area of cube.
b) Find the volume of cube.

Teaching materials: Model of cube, formula chart

Teaching activities:

a) Discuss about the formulas of surface area and volume of cube.
   By showing model of cube, how many faces does this solid have? Ask them about the shape of faces.
b) Giving one example, make clear them to calculate area and volume of cube.
   Find the volume of the cube of 8cm length.
   To solve this problem, following discussion can be made.
   How many faces does this model have?( By showing model of cube).
   Can you about the shape of faces of cube? Collecting the responses of some students, this problem can be done by discussion.
   Length ( l ) = 8cm
   Volume ( v ) = ?
   Ask to some students
   We know that volume of cube $v = l^3$
   $=( 8cm )^3$
   $= 512cm^3$
c) Let them to do some examples.

Evaluation:

a) Which formula is applicable for finding the surface area of cube?
b) Which formula can we use to find the volume of cube?

Homework:

a) Find the volume of the cube of length 5 cm.
b) Find the surface area of cube having length 10 cm.
c) If volume of cube is 125 $cm^3$, find its length and surface area.

## Appendix –B

## Pre test/post test

DISTRICT INSTITUTE OF EDUCATION AND TRAINING

TIRUR – 602 025, TIRUVALLUR DISTRICT.

RESEARCH PROJECT

2023 – 2024

Researcher

THIRU. M. RAMU
SENIOR LECTURER
SCERT, CHENNAI – 600 006.

PARTICULARS TO BE FILLED BY THE STUDENTS

| | |
|---|---|
| Name | |
| Class | |
| Name of the School | |
| Gender | Male/Female |
| Age | 12/ 13/ 14/ 15 |
| Residence | Rural/ Urban |
| Occupation of the Parents | Coolie/ Government/ Private |
| Educational qualifications of the parents | Below 12 std/Degree |

## Pre test/ Post-test Questions

Class: VIII

Time: 1.30 hrs Marks 30X 1= 30

Tick the best answer.

1. Which is the formula for finding perimeter of rectangle?

   (a) 2 (l + b) (b) l × b (c) 4l (d) $l^2$

2. Area of cube is……..

(a) $5l^2$ (b) l×b×h (c) $6l^2$ (d) 4l

3. How many faces does cuboid have?

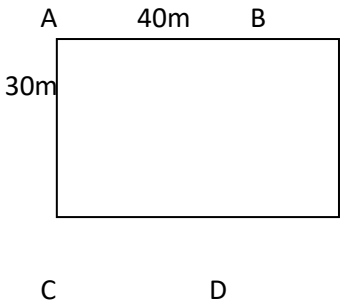
(a) 8 (b) 7 (c) 6 (d) 5

4. The length of a square room is 10m, what is its perimeter?

(a) 40 m (b) 20 m (c) 30 m (d) 50 m

5. What is the area of given figure?

(a) 70 $m^2$ (b) 1200 $m^2$ (c) 700 $m^2$ (d) 140 $m^2$




6. Which is the formula for finding the perimeter of square?

a) 4l b) 2 ( l + b ) c) $l^2$ d) l+ b

7. Area of cuboid is…

a) 2(lb+lh+bh) b) $6l^2$ c) lb d) lxbxh

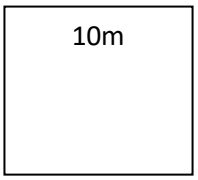
8. How many faces does a cube have?

a) 5 b) 6 c) 8 d) 10

9. The length and breadth of rectangle are 5cm and 4cm, what is its area?

a) $40cm^2$ b) $20cm^2$ c) $18cm^2$ d) $9cm^2$

10. What is the area of the given figure.



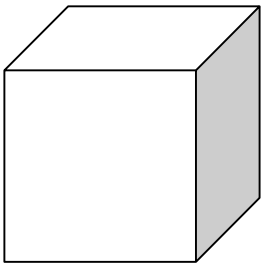

a) 20 $m^2$ b) 100 $m^2$ c) 40 $m^2$ d) 50 $m^2$

11. Perimeter of the square whose area is 100$cm^2$.

a) 40cm b) 20cm c) 18cm d) 10cm

12. Surface area of the given cube.

8cm



a) 256$cm^2$ b) 48$cm^2$ c) 384$cm^2$ d) 64$cm^2$

13. volume of cube is 125 $cm^3$ then its area

a) 20 $cm^2$ b) 25$cm^2$ c) 150 $cm^2$ d) 100$cm^2$

14. A cuboid has volume 400$cm^3$, if its breadth and height are 8cm and 5cm, then its length.

a) 25cm b) 100cm c) 20cm d) 10cm

15. Perimeter of the figure

20cm

10 cm

a) 30 cm b) 200cm c) 60cm d) 50 cm

**16. Area of a circle with radius 'a' is:**

a) $\pi a^2$ b) $\frac{1}{2} \pi a^2$ c) $2\pi a^2$ d) $4\pi a^2$

**17. 1 litre is equal to how many cubic centimeters?**

a) 10 cu.cm b) 100 cu.cm c) 1000 cu.cm d) 10000 cu.cm

**18. The perimeter of a rectangle with length (5cm) and width (3.5 cm) is:**

a) 17.5cm b) 8.35cm c) 8.5cm d) 17cm

**19. If the length and breadth of a rectangle are 15cm and 10cm, respectively, then its area is:**

a) 100 sq.cm b) 150 sq.cm c) 115 sq.cm d) 200 sq.cm

**20. The area of a rhombus whose diagonals are of lengths 10 cm and 8.2 cm is:**

a) 41 $cm^2$ b) 82 $cm^2$ c) 410 $cm^2$ d) 820 $cm^2$

**21. The area of a trapezium is 480 $cm^2$, the distance between two parallel Sides are 15 cm and one of the parallel side is 20 cm. The other parallel side is:**

a )20 cm b) 34 cm c) 44 cm d) 50 cm

**22. The area of a rhombus is 240 $cm^2$ and one of the diagonals is 16 cm. Find the other diagonal.**

a) 1 6 cm b) 20 cm c) 30 cm d) 36 cm

**23. A cuboid has _____ pairs of identical faces.**

a) 2 b) 3 c) 4 d) 5

**24. A cylindrical box has ____ curved surface and ____ circular faces, which are identical.**

a) One, One b) One, two c) two, one d) two, two

**25. If a cuboidal box has height, length and width as 20 cm, 15 cm and 10 cm respectively. Then its total surface area is:**

a) 1100 $cm^2$ b) 1200 $cm^2$ c) 1300 $cm^2$ d) 1400 $cm^2$

**26. Circumference of the circle of radius 7 cm is**

a) $14\pi$cm  b) $49\ \pi$cm  c) $21\pi$ cm  d) $28\pi$ cm

**27. Area of the circle of diameter 14 cm is**

a) $20\pi$cm$^2$  b) $49\pi$cm$^2$  c) $28\ \pi$cm$^2$  d) $196\pi$cm$^2$

**28. If the circumference of the circle is $10\pi c$m, then its area**

a) $400\pi$cm$^2$  b) $20\pi$cm$^2$  c) $25\ \pi$cm$^2$  d) $100\pi$cm$^2$

**29. If the area of the circle is $64\ \pi$cm$^2$ then its circumference is**

a) $32\pi$cm  b) $16\ \pi$cm  c) $8\pi$ cm  d) $64\pi$ cm

**30. Perimeter of a sector**

a) l +2r  b) 2 ( l + b )  c) r+2l  d) l+ b

மாவட்ட ஆசிரியர் கல்வி மற்றும் பயிற்சி நிறுவனம்

திருவூர் – 602 025, திருவள்ளூர் மாவட்டம்.

ஆய்வுத்திட்டம்

2023 – 2024

ஆய்வாளர்

திரு. மா. ராமு

முதுநிலை விரிவுரையாளர்

மாநிலக் கல்வியியல் ஆராய்ச்சி மற்றும் பயிற்சி நிறுவனம்

சென்னை – 600 006.

ஆய்வுக்குட்படுவோர் தன்விவரம்

| | |
|---|---|
| பெயர் | |
| வகுப்பு | |
| பள்ளியின் பெயர் | |
| பாலினம் | ஆண் / பெண் |
| வயது | 12/ 13/ 14/ 15 |
| மாணவர் இருப்பிடம் | நகரம்/ கிராமம் |
| பெற்றோர் தொழில் | கூலி/ அரசு/ தனியார் நிறுவனம் |
| பெற்றோர் கல்வித்தகுதி | 12ஆம் வகுப்புக்கீழ்/ பட்டப்படிப்பு |

முன்தேர்வு/ பின்தேர்வு வினாத்தாள்

எட்டாம் வகுப்பு

காலம் : 1. 30 மணி மதிப்பெண் 30 × 1 = 30

சரியான விடையைத் தெரிவுசெய்க.

1.செவ்வகத்தின் சுற்றளவைக் காண உதவும் சூத்திரம் எது?

a) 2 (l + b) b) ( l × b) (c) 4l (d) $l^2$

2.கனசதுரத்தின் பரப்பளவு

a) $5l^2$ b) l×b×h c) $6l^2$ d) 4l

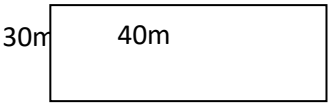
3.கனசெவ்வகத்திற்கு எத்தனை முகங்கள்?

(a) 8 (b) 7 (c) 6 (d) 5

4.சதுர வடிவம் கொண்ட ஓர் அறையின் நீளம் 10 மீட்டர் எனில், அதன் சுற்றளவு

(a) 40 m (b) 20 m (c) 30 m (d) 50 m

5. கொடுக்கப்பட்டுள்ள படத்தின் பரப்பளவு




(a) 70 $m^2$ (b) 1200 $m^2$ (c) 700 $m^2$ (d) 140 $m^2$

6.சதுரத்தின் சுற்றளவைக் கண்டறிய உதவும் சூத்திரம்

a) 4l b) 2 ( l + b ) c) $l^2$ d) l+ b

7. கனசெவ்வகத்தின் பரப்பளவு ----------

a ) 2(lb+lh+bh) b) $6l^2$ c) lb d) lxbxh

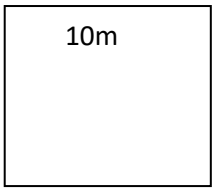
8.கனசதுரத்திற்கு எத்தனை முகங்கள்?

a ) 5 b) 6 c) 8 d) 10

9. செவ்வகத்தின் நீள அகலங்கள் முறையே 5 செமீ, 4 செமீ எனில் அதன் பரப்பளவு

a) $40cm^2$ b) $20cm^2$ c) $18cm^2$ d) $9cm^2$

10.கொடுக்கப்பட்டுள்ள படத்தின் பரப்பளவு




a) 20 $m^2$ b) 100 $m^2$ c) 40 $m^2$ d) 50 $m^2$

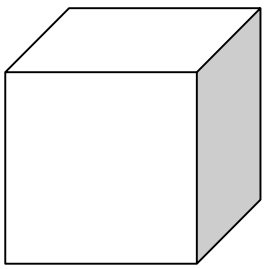
11. சதுரத்தின் பரப்பளவு 100 ச.செமீ எனில், அதன் சுற்றளவு

a) 40 cm (b) 20 cm (c) 30 cm (d) 50 cm

12.கொடுக்கப்பட்ட கனசதுரத்தின் மேற்பரப்பு

a) $256m^2$ b) 384 $m^2$ c)64 $m^2$ d) 600 $m^2$

8m



13. கனசதுரத்தின் கனஅளவு 125க.செமீ எனில் அதன் பரப்பளவு

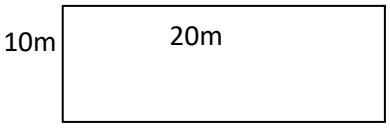
a) 20 $cm^2$ b) 25$cm^2$ c) 150 $cm^2$ d) 100c

14. கனசெவ்வகத்தின்கனஅளவு 400 க. செமீ. அதன்

அகலம் 8 செமீ, உயரம் 5 செமீ. எனில் அதன் நீளம்

a) 25cm b) 100cm c) 20cm d) 10cm

15. கொடுக்கப்பட்ட படத்தின் சுற்றளவு




a) 30 m b) 100m c) 60m d) 40m

16. 'a' ஆரமுள்ள வட்டத்தின் பரப்பளவு ----------

a) $\pi a^2$ b) ½ $\pi a^2$ c) $2\pi a^2$ d) $4\pi a^2$

17. ஒரு லிட்டர் எத்தனை கனசதுர செமீக்குச் சமம்?

a) 10 cu.cm b) 100 cu.cm c) 1000 cu.cm d) 10000 cu.cm

18. 5 செமீ நீளம், 3 .5 செமீ அகலம் கொண்ட செவ்வகத்தின் சுற்றளவு

a) 17.5cm b) 8.35cm c) 8.5cm d) 17cm

19. 15 செமீ நீளம், 10 செமீ அகலம் கொண்ட செவ்வகத்தின் பரப்பளவு

a) 100 sq.cm b) 150 sq.cm c) 115 sq.cm d) 200 sq.cm

20. 10 செமீ , 8.2 செமீ மூலைவிட்டங்கள் கொண்ட சாய்சதுரத்தின் பரப்பளவு

a) 41 $cm^2$ b) 82 $cm^2$ c) 410 $cm^2$ d) 820 $cm^2$

21. ஒரு சரிவகத்தின் பரப்பளவு 480 ச.செமீ . அதன் இணைகோடுகளுக்கு இடையேயுள்ள தூரம் 15 செமீ. ஓர் இணைகோட்டின் நீளம் 20 செமீ எனில் அதன் மற்றோர் இணைகோட்டின் நீளம்---

a) 20 cm b) 34 cm c) 44 cm d) 50 cm

22. ஒரு சாய்சதுரத்தின் பரப்பளவு 240 ச.செமீ அதன் ஒரு மூலைவிட்டம் 16 செமீ எனில், மற்றொரு மூலைவிட்டத்தின் அளவு

a) 1 6 cm b) 20 cm c) 30 cm d)40 cm

23. கனசெவ்வகத்திற்கு ---------- ஒரே மாதிரியான ஜோடி முகங்கள் உள்ளன.

a) 2 b) 3 c) 4 d) 5

24. ஓர் உருளையின் ----------வளைபரப்பும் ----------வட்டப்பரப்பும் ஒரே மாதிரியாக இருக்கும்.

a) 1, 1 b) 1, 2 c) 2, 1 d) 2, 2

25. கனசெவ்வகப் பெட்டியின் உயரம், நீளம், அகலம் முறையே 20 செமீ, 15 செமீ எனில், அதன் மொத்த பரப்பளவு

a) 1100 $cm^2$ b) 1200 $cm^2$ c) 1300 $cm^2$ d) 1400 $cm^2$

26. 7 செமீ ஆரமுள்ள வட்டத்தின் சுற்றளவு

a) $14\pi$cm b) 49 $\pi$cm c) 21$\pi$ cm d) 28$\pi$ cm

27. ஒரு வட்டத்தின் விட்டம் 14 செமீ எனில், அதன் பரப்பளவு

a) $20\pi cm^2$ b) $49\pi cm^2$ c) 28 $\pi cm^2$ d) $196\pi cm^2$

28. ஒரு வட்டத்தின் சுற்றளவு $10\pi$cm எனில் அதன் பரப்பளவு

a) $400\pi cm^2$ b) $20\pi cm^2$ c) 25 $\pi cm^2$ d) $100\pi cm^2$

29. ஒரு வட்டத்தின் பரப்பளவு $64\pi cm^2$ எனில் அதன் சுற்றளவு

a) $32\pi$cm b) 16 $\pi$cm c) 8$\pi$ cm d) 64$\pi$ cm

30. வட்டகோணப்பகுதியின் சுற்றளவுக்கான சூத்திரம்

a) l +2r b) 2 ( l + b ) c) r+2l d) l+ b

**Appendix-D**

**Pre-test scores of control and experimental groups**

| S.No | Name of the Students of Control Group | Scores | Name of the Students of Experimental Group | Scores |
|---|---|---|---|---|
| 1 | E.SANGEETHA | 8 | M.OVIYA | 9 |
| 2 | S.SURUTHIKA | 7 | M.NISHABANU | 10 |
| 3 | V.MAGALAKSHMI | 8 | N.SANDHIYA | 11 |
| 4 | L.KEERTHANA | 7 | K.DEEEPIKA | 12 |
| 5 | K.KRITHIKA | 10 | V.SINDHU | 5 |
| 6 | S.ASINI | 5 | N.YAMINI | 13 |
| 7 | M.SUBHASREE | 14 | S.SRIRAM | 3 |
| 8 | M.NADHINI | 13 | S.NITHISH | 6 |
| 9 | R.VARSHINI | 13 | C.PARTHIBAN | 6 |
| 10 | V.KAVIYA | 8 | S.PRAKASH | 10 |
| 11 | G.DIVYASREE | 4 | S.PARTHIBAN | 9 |
| 12 | B.ISHWRYA | 5 | P.PERUMAL | 12 |
| 13 | M.SHARMILA | 3 | R.GOWTHAM | 4 |
| 14 | S.KANMANI | 8 | K.HARISH | 4 |
| 15 | V.ASHWINI | 13 | B.BHUVANESHVARAN | 8 |
| 16 | K.NITHSHKUMAR | 7 | M.ABARNA MARY | 14 |
| 17 | M.KUMARAN | 9 | D.SHAMLATHA | 3 |
| 18 | M.RUESH | 10 | G.JAYAPRIYA | 4 |
| 19 | M.JAGADEESH | 9 | K.POOJA | 10 |
| 20 | K.YAGAVA NARAYANAN | 8 | P.KAVIYA | 8 |
| 21 | P.PRAVEENKUMAR | 13 | C.DHIVIYADARSHINI | 5 |
| 22 | R.VASANTH KUMAR | 7 | S.MONISHA | 7 |
| 23 | S.BHARATHIRAJ | 15 | V.HEMALATHA | 4 |
| 24 | Y.SUMANRAJ | 7 | A.PRITHISH | 4 |
| 25 | R.HARISHRAJ | 4 | M.HARIHARAN | 6 |
| 26 | R.ANEESWARAN | 5 | M.JAGADEESH | 6 |
| 27 | R.N.SAISUDHAN | 8 | E.ASWINKUMAR | 5 |
| 28 | K.SARVESH | 4 | T.CHANDRU | 4 |
| 29 | S.KISHORE KUMAR | 6 | S.ASHWIN | 7 |
| 30 | S.KISHORE | 7 | S.RAGITU | 3 |
| | | | | |

## Post-test scores of control and experimental groups

| S.No | Name of the Students of Control Group | Scores | Name of the Students of Experimental Group | Scores |
|---|---|---|---|---|
| 1 | E.SANGEETHA | 14 | M.OVIYA | 15 |
| 2 | S.SURUTHIKA | 13 | M.NISHABANU | 25 |
| 3 | V.MAGALAKSHMI | 11 | N.SANDHIYA | 18 |
| 4 | L.KEERTHANA | 10 | K.DEEEPIKA | 19 |
| 5 | K.KRITHIKA | 14 | V.SINDHU | 20 |
| 6 | S.ASINI | 9 | N.YAMINI | 21 |
| 7 | M.SUBHASREE | 20 | S.SRIRAM | 25 |
| 8 | M.NADHINI | 17 | S.NITHISH | 12 |
| 9 | R.VARSHINI | 16 | C.PARTHIBAN | 20 |
| 10 | V.KAVIYA | 12 | S.PRAKASH | 16 |
| 11 | G.DIVYASREE | 7 | S.PARTHIBAN | 17 |
| 12 | B.ISHWRYA | 9 | P.PERUMAL | 23 |
| 13 | M.SHARMILA | 9 | R.GOWTHAM | 16 |
| 14 | S.KANMANI | 13 | K.HARISH | 13 |
| 15 | V.ASHWINI | 16 | B.BHUVANESHVARAN | 13 |
| 16 | K.NITHSHKUMAR | 11 | M.ABARNA MARY | 24 |
| 17 | M.KUMARAN | 12 | D.SHAMLATHA | 19 |
| 18 | M.RUESH | 13 | G.JAYAPRIYA | 12 |
| 19 | M.JAGADEESH | 14 | K.POOJA | 20 |
| 20 | K.YAGAVA NARAYANAN | 11 | P.KAVIYA | 19 |
| 21 | P.PRAVEENKUMAR | 17 | C.DHIVIYADARSHINI | 12 |
| 22 | R.VASANTH KUMAR | 10 | S.MONISHA | 14 |
| 23 | S.BHARATHIRAJ | 18 | V.HEMALATHA | 16 |
| 24 | Y.SUMANRAJ | 10 | A.PRITHISH | 14 |
| 25 | R.HARISHRAJ | 9 | M.HARIHARAN | 15 |
| 26 | R.ANEESWARAN | 10 | M.JAGADEESH | 22 |
| 27 | R.N.SAISUDHAN | 12 | E.ASWINKUMAR | 21 |
| 28 | K.SARVESH | 9 | T.CHANDRU | 16 |
| 29 | S.KISHORE KUMAR | 10 | S.ASHWIN | 20 |
| 30 | S.KISHORE | 11 | S.RAGITU | 16 |
| | | | | |

## Appendix-G

### Questionnaire for Interview with Students

1) What do you feel when I taught you using instructional materials?
2) What type of difference do you find while teaching using materials and without using materials?
3) Is it necessary to use instructional materials for teaching mathematics at upper primary level?
4) Which way of teaching is better according to your view, using materials or without using materials?
5) Does your teacher use instructional materials for teaching mathematics?
6) Are you satisfied with the teaching methods of your teacher?

## Appendix-H

### Classroom observation checklist

This observation form was used to observe the effectiveness of instructional materials in teaching mensuration at upper primary level. Under following seven indicators, it was observed.

| **S. N.** | **Statement** | **Indicators** | | |
|---|---|---|---|---|
| 1 | Interest of students in learning | | | |
| 2 | Involvement of students in class activities | | | |
| 3 | Motivation | | | |
| 4 | Classroom environment | | | |
| 5 | Behavior with friends | | | |
| 6 | Relation between teacher and student | | | |
| 7 | Regularity of students | | | |

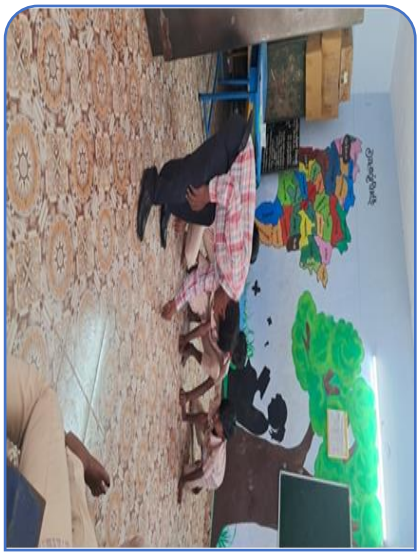
**PHOTO GALLERY**

**Pre-test**

**Teaching by using instructional materials**

## Introducing instructional materials

## Demonstraion



**Explaining the mensuration concepts using TLM**

**Conducting post- test**