Modern Educational Methods and Strategies in Teaching Mathematics

Modern Educational Methods and Strategies in Teaching Mathematics:

Changing Thoughts

By

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PREFACE

Mathematics is the peak of precision, as evidenced by symbols in calculations and formal proofs. Symbols, after all, are just that: symbols, not ideas. Mathematics' intellectual content is found in its ideas rather than the symbols themselves. In other words, the intellectual content of mathematics is not found in the symbols, where the mathematical rigor is most immediately visible. Human thoughts, instead, are the source of the problem. However, mathematics does not and cannot scientifically analyze human concepts on its own; human cognition is not its domain. It is up to cognitive science and neuroscience to achieve what mathematics cannot: apply the science of mind to human mathematical concepts. The human brain and mental capabilities constrain and structure mathematics as we know it. The only mathematics we know or can know is based on the brain and thinking.

Traditional school mathematics is typically defined by an overreliance on meaningless paper-and-pencil computations, precisely written problems that follow prescribed methods, and a focus on meaningless symbolic manipulation. The importance of individual seatwork is highlighted. The authority sources for determining the validity of an answer are the teacher, the textbook, and the answer key. Many of these traits of traditional classroom mathematics still exist, but they are competing with other qualities as teachers attempt to modify the way they teach mathematics. When we enter a math classroom these days, we are likely to observe kids working in groups, manipulating materials, and talking and writing about mathematics. They frequently engage in mathematically demanding tasks, and the textbook (if used at all) serves as yet another resource in the classroom.

However, there can be significant variances between classrooms. Even reform-oriented classrooms are part of a larger framework in which different perceptions of what constitutes mathematics influence what happens in them. Mathematicians frequently refer to a specific element of playfulness in their work of "messing around" with ideas in their search for justifications, counterexamples, and so forth; mathematicians often refer to particular element of playfulness in their work, of "messing around" with ideas in their search for justifications, counterexamples, and so forth;

mathematicians often refer to a particular element of playfulness in their work, of “messing.

This book looks into the subject of classroom mathematics education. Students’ understanding and enthusiasm for mathematics grow as they progress through elementary school, as do their thinking skills. The five building blocks of learning mathematics for primary children and motivational and affective determinants in elementary school mathematics were defined here. Mathematical aptitude is also critical for a society’s economic success. Other professions, such as engineering, sciences, social sciences, and even the arts, require a firm grasp of mathematics. Thus, identity formation and how students prefer to learn are stated in secondary mathematics education.

In general, humans use mathematics daily, and this daily use of mathematics causes the human brain to express issues, ideas, and solutions necessary for the human race’s survival, so this book explains how to teach math to Senior Secondary School students using problems and interventions. The book also included a quick overview of curriculum design and the main components of curriculum development. It will be shown in the following sections that mathematics education and learning may be viewed as a progressive system. It also included student involvement in learning and teacher ideas about teaching mathematics, the use of technology in math through cellphones and gaming, and the implications of developmental cognitive neuroscience for learning and teaching for academic success. The book came to a close with a discussion of the challenges and benefits of the mathematical education system.

CHAPTER 1

MATHEMATICS EDUCATION FOR SCHOOL

1.1 Introduction

Amount (numbers), organization, space, and change are all studied in mathematics. Mathematicians and philosophers have differing perspectives on the scope and definition of mathematics. Investing in children's teaching reflects a nation's sense of modernity and progress. If science education has frequently been referred to as a social asset in the imagined prospect, learning in the "great roads of math" may be its desire for the yet-to-be-envisioned future (National Board of Higher Mathematics, 2012). Presidents and Prime Ministers emphasize the importance of mathematics and science education in preparing the nation's children to face the tests of the 'modern economy. Many countries recognize the importance of developing a mathematically literate populace and envision a powerful mathematical elite capable of shaping the knowledge-based society of the twenty-first century. Simultaneously, mathematical ability is universally seen as complex to attain (NCERT-National Council of Educational Research and Training, 2006).

In opposition to the aspirations of the globalist elite, the student's goals and aims must be addressed. Education can be seen as the essential weapon for breaking out of poverty in a mainly impoverished population (by any criterion). The capacity to 'calculate,' 'evaluate,' and 'predicts' are essential life skills that education must (and ideally does) teach. One feels the intelligence of dissatisfaction that such talents are not imparted through a formal curriculum. A grocer passionately protested in 2006 at a public hearing where a curriculum committee met members of the public whom he could never attract cultured young people who could estimate whenever inventories needed to be refilled and by how much (National Board of Higher Mathematics, 2012).

Thus, how would you describe math education in school? We believe this was a combination of severe systemic issues. However, growing young people face them with optimism, in a place with numerous ideas, creativities, and a chaotically running system.

1.2 Realistic mathematics education

RME refers to Realistic Mathematics Education, a domain-specific math teaching concept developed in the Netherlands. RME is distinguished by the prominence of rich, "realistic" scenarios in the learning process. These scenarios form a basis for creating math models, methods, and methods, as well as a framework in which students can subsequently use their knowledge of mathematics, which became more conventional and generic over time and low context detailed. While 'realistic' circumstances in the sense of 'real-world' situations were crucial in RME, the term "realistic" here has a broader definition (Van den Heuvel-Panhuizen, 1996). It suggests that students are presented with problem scenarios that they could imagine. The definition of "realistic" comes from the Dutch phrase 'zich realiseren,' which means "to imagine." RME gets its name from this emphasis on creating everything real in your imagination. As a result, challenges taught to students in RME could come from the actual world and the fantasy land of the formal world of maths, as long as the issues were contextually actual in the students' minds (Greer & Brian, 2009).

1.2.1 Evolution

Mathematical evolution can be viewed as an already set of abstractions or as a broadening of subject matter. It is recognized that, for example, a gathering of 2 apples and a group of two oranges have something similar, namely the number of its individuals. It was possibly the first concept accepted by many creatures. In adding to counting physical objects, as shown by bone tallies, prehistoric populates may have recognized how to tally notional amounts such as time, days, season, and years. Further advanced mathematics did not even exist until the Egyptians and Babylonians started with geometry, algebra, and arithmetic for taxation and other economic computation, engineering and astronomy, and structure, approximately 3000 BC. Trading, land surveying, painting and weaving designs, and time recording were among the first applications of math. Primary arithmetic (subtraction, addition, division, and multiplying) first occurs in the archaeological evidence in Babylonian mathematics. Maths preceded writing, and number systems were numerous and varied, with Egyptians creating the earliest known written numerals in Middle Kingdom documents, including the Rhind Mathematics Papyrus (Gravemeijer &

Koeno, 1994). With Greek mathematics, the Greeks and Romans carried out, between 600 and 300 BC, a scientific study of math in its rights. Since then, mathematics has grown significantly, and there has been a beneficial interplay between mathematics and science, which has benefited both. Mathematical breakthroughs are still being made today. “The percentage of books and papers shown in the Math Review sites database since 1940 was now more than 1.9 million, and more than 75 thousand substances were decided to add to the file every year” (Mikhail B. Sevryuk) in the January 2006 issue of the Bulletin of the American Arithmetic Society. New mathematical theories and proof are found in the vast majority of publications in this ocean (Van den Heuvel-Panhuizen et al., 2020).

1.2.2 Inspiration, pure and applied mathematics, and aesthetics

Math is derived from a wide range of issues. These were first discovered in trade, land measuring, architecture, and astronomy; now, all disciplines propose difficulties that mathematicians should investigate, and many of these issues originate inside mathematics itself. For instance, to use a mixture of math skills and physiological insight, the physicist Richard Feynman created the integral path formula of quantum mechanics. Today modern string concept, a still-developing technical hypothesis that tries to unify the four fundamental natural forces, endures outstanding new mathematics (d’Ambrosio & Ubiratan, 1986).

Specific mathematics is only helpful in the field in which it was developed and is only used to address issues in that field. However, mathematics influenced by one domain frequently proves helpful in several areas and becomes part of the overall stock of mathematical conceptions. The contrast between pure mathematics and applied mathematics is frequently made. Nevertheless, pure mathematics concepts, such as number theory in cryptography, frequently have used. As Eugene Wigner put it, the “unreasonable efficiency of mathematics” is an extraordinary reality that even the “purest” arithmetic frequently finds practical uses. The growth of information in the modern period has led to emphasis, as it has in many fields of study. There are currently 100s of emphasized topics in mathematics, and one of the topics is Mathematics Taxonomy with 46 pages long. Specific fields of applied mathematics, such as stats, operations research, and computer science, have fused with relevant societies outside of mathematics to become fields in their own right (Skovsmose & Ole, 1990).

Most mathematics has distinct effects observed for technologically proficient people. Most mathematicians speak about mathematics' refinement, natural aesthetics, and natural self. The importance of simplicity and generalization is emphasized. A straightforward and graceful demonstration, including Euclid's proof of which there are substantially many significant factors, and an attractive arithmetical approach, including the quick Fourier transform, are both beautiful. In a Mathematician's Apology, G.H. Hardy articulated the idea that these aesthetic factors were adequate to warrant the investigation of pure mathematics on their own. He highlighted elements that add to a mathematical beauty: relevance, unpredictability, inevitability, and economy. Mathematicians frequently seek out extremely elegant arguments, such as proofs from 'The Book' of God, by Paul Erdos. Another measure of how many people like solving mathematical problems is the prevalence of recreational mathematics (Ernest & Paul, 1985).

1.2.3 Structure

As illustrated in Figure 1.1, the education system is divided into periods of development ranging from pre-primary to post-graduate. Elementary (primary and upper elementary) and secondary education were governed separately. Undergraduate education lasts three years, whereas professional degrees last 3-4 years. Universities were controlled centrally but administered locally, with a system of associated colleges that provide undergrad degrees (Halmos & Paul, 1981). The whole education system is governed by the Ministry of Human Resource Development, with every state government holding its own Education Ministry and a Central Advisory Board of Education serving as a stage for interactions between the Centre and states. In total, 43 Boards of School Education exist across the nation, and they are responsible for developing curricula, training teachers, and granting certification. The National Council of Educational Research and Training oversees school education (Keitel & Christine, 1989).

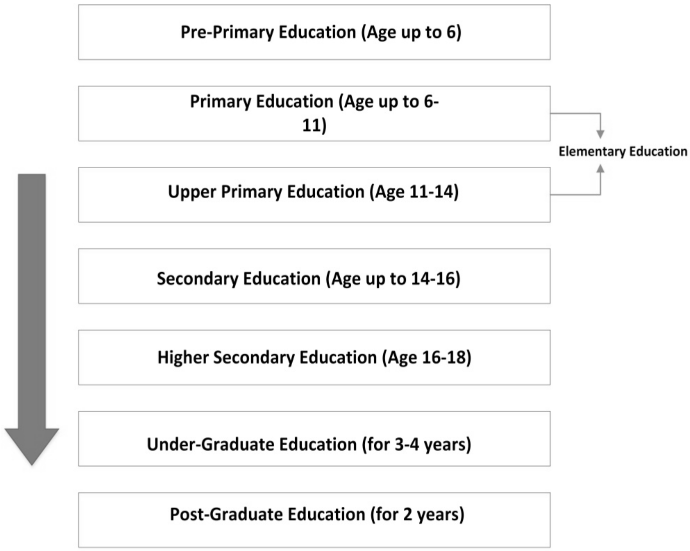

Figure 1.1 Different levels of education

The Ministry of education is the leading organization for syllabus concerns, except for the Central Board of Secondary Education, which determines syllabi. Each university develops its specific curriculum, but the University Grants Commission oversees how they are implemented. A thriving Open University system and the National Institute of Open Schooling aim to give access to education by bridging possible gaps created by these systems (Bishop & Alan, 1988).

1.3 Teacher Quality/Teaching Environment

The educational environment is dismal for the majority of students. The school comprises a one-room schoolhouse with one teacher covering various grades and 30 students per educator. It is worth noting that many remote public schools lack even the most necessities. Aside from these challenges, many rural schools were severely understaffed by a lack of resources. Though one teacher might well have forty students in a class on the median, the refusal of many instructors to take remote rural postings (attempts to change these posts through lobbying and court disputes) means. However, the enrolled student ratio was significantly higher in many rural areas. High levels of teacher absence and low levels of teaching activity worsen high student-teacher ratios (Belsito & Courtney, 2016).

Primary education is not easy to scale up. It enhances instructional results for young students unless it makes significant determinations to recruit extensive statistics of new teachers and invests properties in upgrading school infrastructure. Education is a well-paid profession, and most teachers were hired primarily on their political ties rather than their subject or pedagogical competence. There was no mechanism to encourage instructors to progress in their academic performance, and inadequate training was obtainable to assist teachers in improving their teaching methods. Whereas the 1986 National Policy on Education improved the required curriculum by raising English and science standards, the revisions were not accompanied by a new instruction and assessment methods. The preceding is a synopsis of a typical school day from the British Council. Although this statement is undoubtedly accurate for urban private schools, this is not the situation in the ordinary government school, as rote learning is still the central objective for passing exams: A typical school day starts between 8:00 and 8:20 a.m. Students go to school for around 6 hours each day, with 40-50 minutes classroom periods and a half–hour lunchtime. Some schools operate for an extended time (about 8 hours) with two breaks. Typically, the school day begins with a morning assembly that incorporates prayers, meditation, important news, special assemblies, Mass Exercises, or any other organized activity for all students and instructors (Moore & Robert, 1994).

Primary classes are often shorter than secondary classes in terms of time. A teacher is in charge of the grade, and another instructor assists her. This is not always the case, and in some remote areas of the country, a single instructor may be in charge of several classes31! In a secondary school, there is usually one class teacher in charge of the entire grade and teaches one or more topics. Throughout their separate sessions, subject professors instruct pupils. Students were obliged to change to the appropriate work areas in the school for several topics such as Arts, Physical Education, Music, Work Experience, Library, Science Practicals, etc. A class in a city usually contains rows of benches and a teacher's desk in the front. One or more bulletin boards (blackboards)/ exhibition spaces and one/more store cabinets are other essential classroom tools. Private schools in cities may have more sources to set up current classrooms, but many are working to develop Hi-tech schools with computer networks and sophisticated coaching tools. On the other hand, some schools in rural and semi-urban areas lack even the most basic amenities such as concrete structures, seats, and chairs.

Nevertheless, many projects are underway in the field of education, particularly to reach out to impoverished societies. A regular classroom session entails the teacher providing directed instruction based on the set curriculum. Teachers were progressively employing the Project style of instruction to motivate pupils to think critically, conduct research, and compile data. The bulk of the work and evaluation is done individually, but students do group work on specific topics and projects.

1.4 Notation, language, and rigor

It was not until the 16th century that most of today's mathematical logic was devised. Math was formerly written out in words, a time-consuming technique that hampered mathematical detection. Many of the notations being used now were created by Euler (1707–1783). Current writing simplifies mathematics for experts, which cannot be exceptionally comforting for newbies. It is incredibly condensed: just some symbols hold a countless deal of information. Applied mathematics notation, like musical notation, has a precise grammar (that varies to some range between authors and disciplines) and encodes data that would be hard to convey in any other way (Harel et al., 1996).

For beginners, mathematics might be hard to decipher. The words like or and only are more specific than in everyday speech. Furthermore, words like open and field have been assigned mathematical definitions. In mathematics, words like homeomorphism and integrable have specific definitions. In addition, mathematical jargon includes abbreviations such as iff for "if and only if." Mathematics needs more accuracy than everyday speech, which is why special notation and technical language are used. The precision of language and reasoning is referred to as "rigor" by mathematicians.

Proof in mathematics is primarily an issue of rigor. Mathematicians desire their findings to follow its axioms systematically. It is to prevent erroneous "theorems" based on flawed intuitions that have happened frequently throughout the field's history. The level of rigor needed in mathematics has changed over time: the Greeks demanded thorough explanations, but the techniques used by Isaac Newton were less rigorous. In the nineteenth century, difficulties with Newton's concepts would lead to a renaissance of meticulous study and formal evidence. Many of the most popular misconceptions about mathematics stem from a lack of rigorous knowledge. Computer-assisted theorems are still a source of contention between mathematicians today. Due to the difficulty of verifying extensive computations. It is possible that such proofs are not stringent enough.

Axioms are formerly supposed to be “self-evident truths”; however, this notion is flawed. An axiom was essentially a string of symbols on a comprehensive level, with intrinsic value only in the context of all derivable formulae in an axiomatic system. Hilbert’s program aimed to axiomatize all of mathematics. However, according to Gödel’s incompleteness concept, every axiomatic system has undecidable formulae, making a comprehensive axiomatization mathematically impossible. However, mathematics was frequently thought to be nothing more than set theory in some axiomatization, so any mathematical assertion or proof might be put into equations within formal logic (Niss & Mogens, 1993).

1.5 Assessment in Mathematics Education

Classroom educators have long used varied assessment methods to observe their students’ learning abilities and inform future guidance. On the other hand, policymakers worldwide constantly use external evaluations to gauge a country’s students’ math skills and, in some cases, to compare a specific understanding to that of students worldwide. As a result, external examinations frequently impact classroom teachers’ teaching techniques. Evaluation is a subject of interest to educators at all levels due to the emphasis placed on it by many stakeholders (Ginsburg & Herbert, 2009).

The Co-chairs and committee members of the two Topic Study Sessions (MITZAV) at RAMA decided to focus on evaluation in mathematics education: RAMA: The National Authority for Measurement and Evaluation in Education in Israel. Formative Evaluation for Mathematics Learning has chosen to work on developing this volume, to recognize discussions and research which may overlap and those that are exact to either class or large-scale valuation in mathematics education. We wish to include an everyday basis for conversations by creating this field questionnaire and evaluating the progress made in evaluation around the world.

This book uses research to address these concerns. It emphasizes particular distinctions concerning the challenges, difficulties, limits, and affordances that come with large-scale and class evaluation in mathematics education, along with some similarities. We acknowledge that the traditions, procedures, intentions, and issues of these two evaluation forms differed vastly. However, we believe there are some areas where there are overlaps that should be discussed, including such assessment item and task design, as well as links and consequences for professional education and experience.

1.6 Mathematical Modeling Approach in Mathematics Education

Rapid progress in technology and information has altered expectations of society regarding individuals and schools. In today's environment, mathematics instructors were intended to increase the amount of students who can devise practical solutions to real-world issues and apply mathematics efficiently in their everyday lives (Saxena et al., 2016). As a result, instead of being afraid of mathematics, kids will like it and understand and appreciate its relevance and power. This procedure of growth and advancement prompted new inquiries in our education systems, which became necessary to test novel educational techniques, methods, and models. Model-based instruction is one of the emerging methods of mathematics education. According to Pesen (2008), models are concrete beings, visuals, and objects that reflect some states of an idea that need to be built. This method has piqued the curiosity of students. The fundamental reason that math is the most significant global education field is that it can be applied in a variety of ways in fields and topics which are unrelated to it. Outside of mathematics, it is frequently employed in a veiled or overt manner, particularly in circumstances of difficulties, situations, or regions involving mathematical models and modeling. Mathematics, according to Freudenthal, was not a closed environment or a subject that should be studied but rather human impacts that must have a connection to reality.

When reviewing the published papers in mathematical modeling, it is clear that much research has been carried out on this topic in other countries. Nevertheless, there has been little research in Turkey on applying the modeling technique in math education. Furthermore, our studies lack a precise definition of mathematical modeling and modeling. The word mathematical modeling is defined in this study, and good examples of models that teacher educators and aspiring mathematics teachers could use in their teaching methods were presented as instances of models found in foreign literature. This research looks at mathematical modeling from a theoretical standpoint and in-class applications in Turkish primary, secondary, and high schools.

Students who study social constructivism build and reorganize their knowledge. To do so, students should participate in problem-solving and exploration tasks, as well as conversations with peers and teachers and experiences to convey their ideas in various ways. Education, according to constructivism, does not occur through the transfer of knowledge but rather through the process of asking questions, researching, and solving issues.

The constructivist method and many general intelligence concepts are at the heart of the new educational programs established by the Ministry of National Education (MNE) in 2005 (Math, Turkish, and Science Technology courses and Social Studies). As a result, active learning strategies and approaches are used in the classroom. The variation in the teaching process is the most critical difference between conventional and constructivist approaches. There has been a shift of focus from a teacher-centered strategy to a student-centered approach. As a result, group work, role play, act-out actions, games, and exploration actions are being used in learner-centered classes in general, and practical mathematical effective teaching, guided finding strategy, math games, and mathematical process model have been used in mathematics in specific (Wigley, 2008).

1.6.1 The major challenge

If someone was to pick one obstacle out of the issues we have discussed as the most essential, it might have to be the creation of a pool of qualified mathematics educators in sufficient numbers. The numbers are there at the primary level, but not with the necessary grasp of mathematics, dispositions into arithmetic, or knowledge of how students learn (fail to study) maths. The societal disparities and resource-poor rural schools necessitate more teacher capability than in more prosperous, democratic cultures. This necessitates the development of new models of teacher development that have yet to be defined. The numbers can be intimidating at higher levels. The current teacher pool is severely insufficient to satisfy the demands, particularly when universal school education becomes a plausible reality within a century. The difficulty of rigor and breadth in mathematical education and experience becomes more severe when dealing with numbers. Developing comprehensive strategies to improve teacher preparation excellence is likely the most pressing need in the math landscape (Freudenthal and Hans, 1981).

1.7 Research

Studying math education is an essential agenda item for mathematics education. Because of its traditional structure, academic institutions that do educational research tend to draw many persons who are neither qualified nor interested. Furthermore, the concept of research delivering answers to curricular conundrums or pedagogy is still outside the realm of educational judgment, which is not to minimize the significant contributions made to reform by both government and non-government projects marked by ingenuity and commitment (English et al., 2012). These, though, do not yet stand on a foundation of inquiry and scathing criticism. The system must develop a method for conducting research on a few fronts in response to well-formulated queries and using the results to affect policy. Internal critique of the field of mathematics and its education and practices are on the agenda for such inquiry. The civilization and its cultural and professional habits provide possibilities for mathematical investigations that a pedagogue could include in their toolset. Nevertheless, a body of research must be established to make practical use of such prospects.

1.8 Summary

Mathematics is increasingly structuring reality, and the ordinary person is becoming increasingly free of the need to apply mathematics. There is an incalculable amount of mathematical knowledge available now, and it is continually developing, and there are people who utilize specific areas of it professionally. However, its extent and eventual specialization place it outside of public education. This chapter discussed realistic mathematical education, the quality of teachers, and the educational environment. This chapter also goes over the mathematical modeling approach in mathematics education.

CHAPTER 2

MATHEMATICS EDUCATION FOR ELEMENTARY SCHOOL

2.1 Introduction

Mathematics is considered the foundation for the growth of some other regions of science, and it is required in elementary education. In general, pupils find maths difficult. As a result, primary school math instruction should be enjoyable and engaging for pupils. Since these pupils might have all job opportunities available to students, early elementary school maths is the same for all learners (Ariani et al. 2017). The objective is to guarantee that all pupils have equal access to opportunities. The essential basic characteristics of mathematics are precision, lack of ambiguity and concealed assumptions, and mathematical reasoning, which are difficult to overstate their significance. A subject is not a maths problem unless established and has a distinct set of answers. In a real mathematics problem, it simply cannot be any concealed assumptions. Term definitions, procedures, and representations must all be precise. Though it is simple to state that maths is rational, describing mathematical thinking is more challenging. The framework of mathematics is built on mathematical reasoning. As a result, a learner should assimilate the reasoning skills that produce a mathematical notion to comprehend it.

Inverting and multiplying decimals is an essential mathematical ability, but mathematical reasoning illustrates why inverting and multiplying fractions is the proper process. This type of mathematical reasoning must be explained, and technical capability is learned using mathematical reasoning. It is a crucial concept that will be considered throughout the debate. Without knowledge, talents are useless, and understanding without talent is useless. Elementary mathematics is made up of five fundamental building blocks. Keep in mind that maths is precise everywhere. There seem to be no concealed implications or confusing assertions. Definitions are necessary and should be accurate. It is all held together by rational thinking, and mathematics permits everyone to solve problems. The fundamental building blocks are not only the framework on which math is built but also prepare students for algebra and mathematics beyond algebra if taught correctly.

2.2 The Five Building Blocks

2.2.1 Numbers

Mathematics is built on the foundation of numbers. Thus children should know how to count and have fast memory of single-digit number concepts for arithmetic operations (and the related facts for subtraction and division). Quick memory enables the students to focus on learning various ideas and solving problems. It is essential in advanced mathematics

2.2.2 Place Value System

The place value system is a complex mechanism for effectively representing whole numbers. The five key construction elements are organized and unified by such a philosophy. However, its significance is frequently neglected; it is the core of the numerical system and, as such, needs far more consideration than it now receives (Wilson 2009). There is much more to it than hundreds, tens, and ones. The basis for university maths is arithmetic and algebra. The cornerstone for both arithmetic and algebra is knowledge and learning of the place value system and how it is applied. Except in the framework of the place value system, mathematical procedures can be explained. Because comprehension is so important, It will start with the place value system. Students must be prepared for algebra in elementary school. Working with equations is only a modest extension of the place value system in algebra. The place value system is an integral part of algebra practice.

2.2.3 Whole Number Operations

In addition, subtraction, multiplication, and division of whole numbers represent the basic operations of mathematics. Much of mathematics is a generalization of these operations and rests on an understanding of these procedures. They must be learned with fluency using standard algorithms. The standard algorithms are among the few deep mathematical theorems that can be taught to elementary school students. They give students power over numbers and, by learning them, give students and teachers a common language. The basic mathematical operations are addition, subtraction, multiplication, and division of whole numbers. Most of the maths is a derivation of such techniques, and it is based on a comprehension of them. It should be learned utilizing established methods and with ease. Standard algorithms are one of the few fundamental mathematical theorems which can be explained to pupils in primary school. They provide learners control over numerals and, by understanding them, numerals provide a common language for students and teachers.

2.2.4 Fractions and Decimals

The four primary mathematical operations using whole numbers should be applied to fractions and decimals and be viewed as an extension of whole numbers. If students want to continue further mathematics, they need to become competent in such calculations for fractions and decimals. Learning fractions is essential for algebra preparation. Knowing ratios in various settings, especially commerce, requires firm foundation infractions.

2.2.5 Problem Solving

Single, two, and multi-step problems (those requiring so many processes to solve) must be covered through a student's mathematics instruction, particularly word or narrative questions. Every new concept or skill should be applied to a sequence of more complex tasks. Critical thinking skills include the ability to translate words into maths and the ability to solve multi-step problems. The purpose of mathematical education is to improve critical thinking.

2.3 Growth in early Elementary School

Researchers looked at performance development throughout third grade of pupils who started preschool with low, medium-low, medium-high, and high mathematics skills, as well as the influence of educator time on mathematics teaching and student involvement in such progress. It was discovered that pupils who started with a minor success level also showed the lowest improvement over time. Students in the second top skill groupings grew at equal rates and the same rates. Pupils in the lowest group had the most fantastic time in class, yet they were the least engaged (Bodovski and Farkas 2007). All pupils improved their grades when they spent more class time, but the effect of involvement was most prominent among the least performing students. The lowest-performing group's reduced involvement accounted for more than half of the poorer performance gain in grade three. Teachers must make more significant