# CHAPTER-1

# INTRODUCTION OF THE STUDY

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# INTRODUCTION

***"To touch the shape of numbers with hand and mind,***
***To let each line and circle unwind—***
***The kit becomes the key, the child explores,***
***And mathematics walks through open doors."***

## 1.0.0 Prologue

The present chapter expounds the background of this study. It consists of the Introduction and Background of the Study, Present Status of the Study, Need for the study, Statement of the Problem, Operational Definitions of the terms, and Assumptions of the Study, Objectives, Hypotheses, and Limitations of the study.

## 1.1.0 Introduction and Background of the study

The present study titled, “A Study of the Effect of teaching-learning through NCERT Mathematics kit on Attitude, Interest and Achievement in Mathematics of class Eighth Students” is an experimental study. In this study the researcher used NCERT Mathematics kit as instructional material to improve Achievement in Mathematics, develop positive Attitude towards Mathematics and enhance Interest in Mathematics among class Eighth Students.

Over the last few decades, there has been a significant shift in the philosophy and practice of mathematics education globally. Traditionally, mathematics was taught in a highly abstract, teacher-centred manner, focusing on formulae, rules, and procedural knowledge. Classrooms were often dominated by lectures, blackboard demonstrations, and repetitive problem-solving exercises. Students were expected to memorize steps and solve problems mechanically, with little room for exploration or conceptual understanding. This method, although structured, failed to cater to diverse learning needs and contributed to widespread math anxiety, low interest, and poor retention, especially among students at the elementary and middle school levels.

In contrast, contemporary approaches to mathematics teaching emphasize conceptual clarity, student engagement, and real-life application. The modern educational

perspective recognizes that mathematics is not just a set of rules but a way of thinking and reasoning. As a result, there is a growing emphasis on activity-based learning, experiential education, and constructivist teaching models. These methods view the learner as an active participant in the learning process who builds knowledge through hands-on experiences and meaningful exploration.

### 1.1.1 The Importance of Mathematics in Education

Mathematics serves as a universal language and a significant instrument for comprehending the world. It is a fundamental aspect of human culture and has played a crucial role in the advancement of science, technology, and logical reasoning. Within the school curriculum, mathematics holds a critical position due to its contribution to fostering analytical thinking, problem-solving skills, spatial awareness, and clarity in communication.

At the middle school level, particularly in Class VIII, students are introduced to more abstract mathematical ideas such as algebra, geometry, linear equations, and data management. These concepts lay the groundwork for advanced mathematics and other science-related fields. Consequently, it is imperative that students at this stage not only grasp mathematical techniques but also cultivate a positive attitude towards the subject.

### 1.1.2 Challenges in Learning Mathematics

Despite its undeniable importance, mathematics is often regarded by students as a difficult and abstract subject. Many learners, particularly at the middle school level, struggle with concepts due to poor foundational understanding, a lack of meaningful context, and monotonous teaching methods. Traditional teaching practices, which often rely on chalk-and-talk approaches, repetitive drills, and rote memorization, fail to capture the interest of students or foster deep conceptual understanding. As a result, many students develop math phobia—a psychological aversion characterized by anxiety, lack of confidence, and avoidance behaviour.

The perception of mathematics as a rigid, rule-based subject creates barriers to learning. Students are often discouraged from asking questions or exploring alternative ways of solving problems, leading to a passive learning environment. Further, when mathematical knowledge is presented in a decontextualized manner, disconnected from students' daily experiences, it loses its relevance and appeal. These challenges are

exacerbated in large, heterogeneous classrooms where individual learning needs are often overlooked.

The problem is not just limited to students' performance in assessments but extends to their overall attitude and emotional relationship with the subject. A negative experience with mathematics during formative years can result in long-lasting academic struggles, reduced participation in STEM fields, and limited career choices. Thus, addressing the barriers in math learning requires a pedagogical shift toward more engaging, student-friendly teaching practices.

### 1.1.3 Shift toward Activity-Based Learning

In recent years, mathematics education has undergone a significant transformation, shifting from traditional rote-learning methods to more interactive and activity-oriented strategies. The constructivist learning theory, which forms the foundation of many contemporary educational philosophies, asserts that students achieve optimal learning outcomes when they actively participate in the educational process. Activity-based teaching fosters an environment where learners can manipulate objects, engage in problem-solving activities, and collaborate with their peers, thus turning learning into a vibrant and participatory experience. This approach emphasizes the discovery of patterns, comprehension of relationships, and visualization of abstract concepts in mathematics. By utilizing tangible materials or manipulatives such as counters, geometric models, or measuring tools, students can better understand concepts such as number sense, fractions, shapes, and measurements. This method not only deepens comprehension but also cultivates curiosity, creativity, and a love for learning.

Furthermore, activity-based techniques facilitate differentiated instruction by addressing various learning styles and multiple intelligences. For example, visual learners gain from diagrams and models, while kinaesthetic learners excel through hands-on activities. This inclusive strategy also aids in closing learning gaps among students from diverse socio-economic and linguistic backgrounds.

In the Indian educational landscape, characterized by crowded and varied classrooms, activity-based teaching presents an effective means to engage students in a meaningful way. It aligns with the objectives of the National Curriculum Framework (2005), which

promotes child-centered, constructivist education that prioritizes conceptual understanding over rote memorization.

### 1.1.4 Introduction to NCERT Mathematics Kit

The NCERT Mathematics Kit represents an innovative approach aimed at facilitating activity-based learning in mathematics education. Created by the National Council of Educational Research and Training (NCERT), this kit includes a diverse array of manipulatives and resources specifically designed to enhance the upper primary and secondary curriculum. The kit features geometric models, algebraic tiles, fraction discs, tangrams, number cards, and various measuring instruments, all of which correspond to particular mathematical concepts.

This kit enables students to engage physically with mathematical objects, allowing them to visualize intricate ideas in a more accessible way. For example, utilizing 3D shapes to investigate surface area and volume, or employing fraction circles to grasp part-whole relationships, promotes a tangible understanding of these concepts. Additionally, these resources facilitate collaborative work, inquiry-based learning, and immediate feedback, which are crucial for developing higher-order thinking skills.

Significantly, the NCERT Mathematics Kit empowers educators to transcend traditional textbooks, encouraging student engagement through demonstration, experimentation, and exploration. It also aids in classroom management, as students tend to stay focused and engaged when participating in hands-on activities. Numerous pilot studies and field observations have indicated that the implementation of the mathematics kit leads to improved student participation, interest, and comprehension. Nevertheless, despite its potential benefits, the kit is not consistently utilized across all educational institutions due to challenges such as inadequate teacher training, limited resources, or logistical issues. Therefore, it is essential to conduct empirical research to assess the kit's effectiveness and identify optimal practices for its application in various educational contexts.

### 1.1.5 Significance of Class VIII in Student Learning

Class VIII marks a pivotal point in a student's educational journey, facilitating the shift from primary to secondary schooling. During this phase, learners encounter more complex and abstract mathematical ideas, including algebraic expressions, linear

equations, geometry, mensuration, and data analysis. Mastery of these subjects necessitates not only procedural skills but also a deep understanding of the underlying concepts.

This period is crucial for students as they begin to develop enduring academic attitudes and preferences. A constructive experience in mathematics during Class VIII can establish a robust foundation for future academic success, whereas a negative experience may result in disinterest, underperformance, and a long-term aversion to mathematics. Consequently, this class is a vital opportunity for implementing innovative teaching methods, such as the NCERT Mathematics Kit. Additionally, adolescents at this stage possess the cognitive ability for advanced thinking but are also susceptible to stress, peer influence, and academic rivalry.

Therefore, it is imperative to create a joyful, interactive, and supportive learning environment to sustain motivation and promote well-being. The incorporation of tangible teaching resources and collaborative learning activities can render mathematics less daunting and more accessible for students at this developmental phase.

## 1.2.0 Need of the Study

### 1.2.1 Addressing Limitations of Traditional Mathematics Instruction

Conventional teaching approaches in mathematics predominantly focus on textbooks and lectures, prioritizing procedural skills rather than conceptual comprehension. This often results in students engaging in repetitive problem-solving without grasping the underlying principles. Consequently, learners tend to be passive and may struggle to apply mathematical concepts in diverse contexts. There is a pressing necessity to shift from these antiquated methods towards more engaging, student-oriented practices that promote critical thinking and effective problem-solving**.**

### 1.2.2 Importance of Hands-on and Experiential Learning

Recent educational studies and teaching theories strongly advocate for experiential learning as an effective approach to deepen student comprehension and involvement. When students engage in hands-on activities, observe trends, and formulate conclusions, their learning becomes more tangible and enduring. The NCERT Mathematics Kit offers a remarkable opportunity to integrate experiential learning

within the classroom. Its activities prompt students to explore and build mathematical understanding, thus enhancing their conceptual clarity and enthusiasm for the subject.

### 1.2.3 Need to Improve Students' Attitude and Interest in Mathematics

Numerous studies indicate that mathematics is frequently regarded as one of the most daunting and unpopular subjects by school students. This negative perception often results in anxiety, diminished self-esteem, and subpar academic outcomes. It is essential to foster a positive attitude towards mathematics, particularly during the middle school years. The implementation of innovative educational resources, such as the NCERT Mathematics Kit, can facilitate enjoyable learning experiences, thereby improving students' attitudes, interest, and motivation to engage with the subject**.**

### 1.2.4 Gap between Policy Provisions and Classroom Practices

Educational frameworks like the National Curriculum Framework (2005) and the National Education Policy (2020) emphasize the significance of experiential and activity-oriented learning, along with the integration of teaching aids in classroom interactions. The distribution of the NCERT Mathematics Kit to numerous government and private educational institutions illustrates this policy objective. Nevertheless, a significant disparity persists between policy and its execution. Educators frequently fail to utilize these kits consistently due to insufficient awareness, inadequate training, or time limitations. Therefore, it is essential to assess the genuine effects of the NCERT Mathematics Kit when it is effectively implemented in actual classroom environments.

### 1.2.5 Understanding Attitude, Interest, and Achievement

In the realm of education, especially within the field of mathematics, cognitive and affective elements are intricately linked. Attitude pertains to a learner's overall disposition, beliefs, and emotional responses towards the subject matter. It includes whether a student perceives mathematics as enjoyable or frustrating, and whether they consider it useful or irrelevant. A favorable attitude is often associated with enhanced engagement and performance, whereas an unfavorable attitude may result in disengagement and suboptimal outcomes.

Interest, conversely, represents the intrinsic motivation or curiosity that drives a student to delve deeper into mathematics. It encompasses enthusiasm, sustained focus, and a readiness to dedicate time and effort to comprehend the subject. Interest is dynamic and can be fostered through meaningful, relevant, and enjoyable educational experiences. The implementation of activity-based teaching methods, utilizing kits and manipulatives, is crucial in igniting and maintaining this interest.

Achievement in mathematics is the quantifiable learning outcome, generally evaluated through assessments such as tests, quizzes, and classroom performance. While achievement indicates a student's knowledge, it is frequently shaped by their attitude and interest. A student who feels confident and engaged is more inclined to excel academically. This research investigates how the three dimensions—attitude, interest, and achievement—are affected by the application of the NCERT Mathematics Kit, thus offering a comprehensive perspective on its influence on learning.

### 1.2.6 Alignment with Educational Reforms and National Goals

The National Education Policy (2020) aims to transform education by promoting competency-based learning and enjoyable experiences. It prioritizes enhancing students' understanding of concepts and their ability to solve problems over memorization. This study supports this vision and addresses the national objective of enhancing mathematics learning outcomes. By implementing a practical intervention with the NCERT Mathematics Kit, this research offers data-driven insights into improving teaching methods to be more effective and centered around students.

## 1.3.0 Statement of the Problem

Many students of class VIII struggle with mathematics due to traditional, rote-based teaching methods that fail to spark interest or develop understanding. Though the NCERT Mathematics Kit offers hands-on, activity-based learning, its impact on students' attitude, interest, and achievement has not been fully explored. This study aims to examine how effectively using this kit can improve learning outcomes in Mathematics. In light of the above, the present research seeks to investigate:

**"A Study of the Effect of Teaching-learning through NCERT Mathematics Kit on Attitude, Interest, and Achievement in Mathematics of Class Eighth Students".**

## 1.4.0 Definition of Key Terms

To ensure clarity and common understanding, the following key terms used in the study are defined:

1. NCERT Mathematics Kit:

   A set of teaching-learning resources and manipulatives, created by The National Council for Educational Research and Training (NCERT), to help middle and secondary school pupils understand mathematical concepts through hands-on activities.

2. Attitude toward Mathematics:

   The feelings, beliefs, and predispositions of students towards learning mathematics, which can be positive, negative, or neutral, influencing their motivation and engagement with the subject.

3. Interest in Mathematics:

   The level of curiosity, enjoyment, and sustained attention that a student shows toward mathematics activities and learning.

4. Academic Achievement in Mathematics:

   The measurable performance of students in mathematics, usually reflected through scores obtained in standardized tests or examinations designed to assess knowledge and skills in the subject.

5. Teaching-Learning Materials (TLMs):

   Physical or digital resources such as models, charts, kits, and aids used to support and enhance the teaching and learning process.

## 1.5.0 Objectives of the Study

The main objectives of the study are as follows:

1. To study the effect of teaching-learning through Mathematics kit on the Attitude towards Mathematics among class $8^{th}$ students by comparing attitude before and after Intervention.
2. To study the effect of teaching-learning through Mathematics kit on the Interest towards mathematics among class $8^{th}$ Students by comparing Interest before and after the Intervention.

3. To study the effect of teaching-learning through Mathematics kit on Achievement in Mathematics among class 8th class students by comparing Achievement before and after the Intervention.

## 1.6.0 Hypothesis of the Study

1. There is no significant difference in the Attitude towards Mathematics of class 8th students before and after being taught using Mathematics kit.

2. There is no significant difference in the Interest towards Mathematics of class 8th students before and after being taught using Mathematics kit.

3. There is no significant difference in the Achievement in Mathematics of class 8th before and after being taught through Mathematics kit.

## 1.7.0 Delimitation of the Study

The present study has been delimited in the following ways to maintain focus, feasibility, and clarity of investigation:

1. The study focuses exclusively on Class VIII students.
2. The subject of study is restricted to mathematics only.
3. Only the NCERT Mathematics Kit is used as the teaching-learning material; other kits or aids are excluded.
4. The duration of the intervention with the kit is limited to 21 days.
5. The study investigates only three variables: attitude, interest, and academic achievement in mathematics.
6. The study is conducted only in one school (DMS, Bhopal)

## 1.6.0 Conclusion

Overall, this chapter lays the foundation for exploring how the NCERT Mathematics Kit can enhance mathematics education by making it more engaging, meaningful, and effective for students in the critical middle school years. The following chapters will detail the research methodology, data analysis, and findings that aim to address these goals.