# CHAPTER 2: REVIEW OF RELATED LITERATURE

A literature review is a crucial component of any research as it systematically examines and synthesizes previous studies on a particular topic. It highlights what is already known, identifies gaps in the existing body of knowledge, and justifies the need for the current study. The review also provides a foundation for the research by contextualizing it within the scope of existing literature.

## 2.1 LITERATURE REVIEW

A **literature review** is a comprehensive and systematic examination of existing research, studies, articles, and other scholarly works related to a specific research topic. It serves as an essential component of any academic work, such as dissertations, research papers, and theses. The primary goal of a literature review is to summarize, analyse, and synthesize the findings from previous research, allowing the researcher to establish a foundation for one's own study. It highlights key themes, identifies patterns, contradictions, and gaps, and provides a critical evaluation of the existing knowledge in the field. By reviewing relevant literature, the researcher is able to contextualize the study within the existing body of work, showcasing how their research will contribute to advancing the current understanding of the subject. The literature review also helps in identifying the methodologies used in similar studies and provides a framework for comparison with the researcher's approach. It is important for ensuring that the researcher is well-informed and builds upon previous knowledge rather than duplicating existing research.

## 2.2 STUDIES CONDUCTED IN INDIA

**NCERT (2006). Position Paper: National Focus Group on Teaching of Mathematics** developed for the National Curriculum Framework (NCF) 2005, advocates a shift from rote memorization to conceptual understanding and problem-solving in mathematics education. It highlights the need for

contextualizing mathematics in the Indian socio-cultural milieu, integrating real-life applications, and promoting inclusivity and equity in classroom practices. The paper's recommendations directly influenced subsequent textbook development and remain central to the design principles of NCFSE 2023.

**Ramanujam & Subramaniam (2012)** in *Mathematics Education in India: Status and Outlook* provides a critical overview of mathematics education in India, highlighting challenges in curriculum design, teacher preparation, and the integration of indigenous knowledge. The authors stress the importance of connecting mathematics to everyday life and cultural heritage, aligning with the NCFSE 2023 theme of "Rootedness in India."

**Mandal & Maiti (2019)** in their study *Mathematics Anxiety and Academic Achievement of Students at Secondary Stage of Education* investigated the relationship between mathematics anxiety and academic achievement among secondary students in West Bengal. The findings reveal a significant negative correlation, especially among female and rural students. The authors emphasize the need for supportive, inclusive pedagogies and curriculum materials that reduce anxiety and foster positive dispositions—an aim echoed in the NCFSE 2023 cross-cutting themes.

**Ghosh & Ghose (2019)** in their study *Gender Differences in Mathematics Perception among Students of Kolkata,* published in the Indian Journal of Educational Research, investigated gender-based perceptions and attitudes towards mathematics among secondary students. It found significant disparities in self-efficacy and attitudes, with girls often underestimating their abilities despite comparable achievement. The authors recommended curriculum and textbook reforms to address gender stereotypes and foster an inclusive environment—directly relevant to NCFSE 2023's focus on inclusion and equity.

**Fatima, (2021)** in her study *A Critical Evaluation of NCERT Mathematics Textbook of Senior Secondary Stage* critically analyzed the structure, content distribution, and pedagogical features of NCERT mathematics textbooks for classes XI and XII. Using content analysis and stakeholder feedback, the study found that while textbooks include historical context and concept organization, there are imbalances in topic distribution (notably, calculus is overemphasized in Class XII). Teachers and students advocated for a more balanced curriculum and better integration of contemporary themes, such as environmental and social issues, to enhance relevance and engagement.

## 2.3 STUDIES CONDUCTED ABROAD

**Cai, & Ni. (2011**) in their study *Investigating curricular effect on the teaching and learning of mathematics in a cultural context: Theoretical and methodological considerations* examined how mathematics curricula in China and the US integrate cultural contexts and problem-solving. The authors find that textbooks embedding historical and cultural references foster deeper engagement and mathematical identity among students, supporting the case for "rootedness" and contextual relevance in curriculum design.

**Drake, & Sherin, (2006)** in their study *Practicing change: Curriculum adaptation and teacher narrative in the context of mathematics education reform* explored how US teachers adapt reformed mathematics curricula to include interdisciplinary and real-world themes. Findings show that successful integration of new themes requires robust professional development and institutional support, as teachers often struggle to translate curricular intentions into classroom practice without adequate guidance.

**Remillard, & Heck, (2014)** in their study *Conceptualizing the curriculum enactment process in mathematics education* proposed a nuanced model of curriculum enactment, distinguishing between the intended, designated, and operational curriculum. Their framework emphasized the active role of

teachers in interpreting and adapting curriculum materials, highlighting that effective integration of cross-cutting themes depends not just on textbook content but also on teacher agency and classroom context. This perspective is crucial for understanding how NCFSE 2023 reforms may be implemented in practice.

**Stylianides, (2016)** in his study *Proving in the Elementary Mathematics Classroom: What it can look like and how teachers can promote it* investigated the inclusion of reasoning and proof in elementary mathematics curricula across Europe and North America. The study demonstrated that age-appropriate proof activities enhance students' logical reasoning and mathematical understanding, supporting the NCFSE 2023 emphasis on values and dispositions.

## 2.4 IDENTIFIED RESEARCH GAPS

While the NCERT (2006) position paper and recent textbook evaluations (Fatima, 2021) discuss the need for contextualization, inclusion, and values, there is a lack of empirical research analyzing how all six cross-cutting themes (rootedness, environmental awareness, inclusion, values, technology, and guidance/counselling) are systematically integrated in current NCERT textbooks at the middle school level.Studies such as Remillard & Heck (2014) and Drake & Sherin (2006) provide robust frameworks for understanding how teachers adapt and enact curriculum materials, but there is limited research on how Indian teachers interpret and implement the new NCFSE 2023 mathematics curriculum, especially concerning cross-cutting themes.

Most Indian research focuses on earlier reforms (NCF 2005) or general textbook analysis, not the specific implementation or impact of NCFSE 2023's cross-cutting themes in mathematics education. While gender and anxiety (Ghosh & Ghose, 2019; Mandal & Maiti, 2019) have been studied, there is a lack of research on how textbooks address intersectional issues—

such as the interplay of gender, socio-economic status, and regional diversity—within the framework of cross-cutting themes.

The cited works provide frameworks for textbook analysis, highlight the importance of cultural and contextual integration, and stress the role of teacher agency in curriculum enactment. However, the research gap is evident: no study comprehensively evaluates the operationalization of NCFSE 2023's cross-cutting themes in the NCERT Grade 6 mathematics textbook. This dissertation addresses that gap by systematically analyzing the extent and manner of cross-cutting theme integration and by exploring the practical challenges and opportunities in their classroom enactment.