
A PEDAGOGICAL ANALYSIS OF GANITA PRAKASH MATHEMATICS TEXTBOOKS UNDER THE FRAMEWORK OF NEP 2020

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ABSTRACT

This study presents a pedagogical analysis of *Ganita Prakash* mathematics textbooks in the context of National Education Policy 2020. The purpose of the study is to examine how far the textbook reflects modern pedagogical principles such as activity-based learning, experiential learning, conceptual understanding, and competency-based education.

A qualitative research design based on content analysis was adopted for the study. The primary data source was the *Ganita Prakash* mathematics textbook developed by National Council of Educational Research and Training. The analysis was conducted using a pedagogical framework consisting of key dimensions such as conceptual clarity, real-life application, learner-centered approach, critical thinking, and assessment practices.

The findings reveal that *Ganita Prakash* strongly aligns with the vision of NEP 2020 by promoting experiential learning, student engagement, and problem-solving skills. The textbook incorporates real-life contexts, visual representations, and activity-based tasks that support meaningful learning. However, the effectiveness of these pedagogical features depends significantly on classroom implementation and teacher facilitation.

The study concludes that *Ganita Prakash* represents a progressive shift in mathematics education in India, moving from rote memorization toward conceptual and competency-based learning as envisioned in NEP 2020.

INTRODUCTION

Mathematics plays a significant role in the intellectual and cognitive development of learners. It develops logical reasoning, analytical thinking, problem-solving abilities, and decision-making skills necessary for everyday life. In recent years, mathematics education in India has

undergone substantial reforms to shift from rote memorization toward conceptual understanding and experiential learning. The introduction of Ganita Prakash textbooks by National Council of Educational Research and Training reflects this transformation in mathematics pedagogy.

The National Education Policy 2020 emphasizes competency-based education, experiential learning, critical thinking, and learner-centered pedagogy. The policy advocates reducing the burden of content while promoting conceptual clarity and application-based learning (Ministry of Education, 2020). In alignment with these recommendations, Ganita Prakash attempts to make mathematics meaningful, engaging, and connected with real-life experiences.

Traditional mathematics teaching in India has often been criticized for emphasizing procedural learning and rote memorization rather than conceptual understanding (NCF, 2005). Students frequently develop fear and anxiety toward mathematics due to mechanical teaching methods and lack of contextual learning opportunities. To overcome these issues, contemporary pedagogical approaches encourage activity-based learning, collaborative learning, inquiry-based teaching, and problem-solving methods. Ganita Prakash appears to incorporate these pedagogical reforms through illustrations, classroom activities, projects, puzzles, and experiential tasks.

The pedagogical foundation of modern mathematics education is deeply influenced by constructivist theories proposed by Jean Piaget and Lev Vygotsky. Constructivism views learning as an active process in which learners construct knowledge through experiences and social interaction (Piaget, 1972; Vygotsky, 1978). Similarly, John Dewey emphasized learning through experience and meaningful classroom engagement (Dewey, 1938). These educational philosophies are reflected in the learner-centered structure of Ganita Prakash.

Therefore, there is a need to critically analyze the pedagogical aspects of Ganita Prakash mathematics textbooks in the context of NEP 2020. Such an analysis can help determine whether the textbook successfully promotes conceptual understanding, experiential learning, and competency-based education among learners.

Statement of the Problem

Mathematics education in India has traditionally been dominated by teacher-centered instruction, rote memorization, and examination-oriented practices. Such approaches often

limit students' conceptual understanding and reduce opportunities for critical thinking, creativity, and real-life application of mathematical concepts. As a result, many learners experience mathematics anxiety and develop negative attitudes toward the subject (National Curriculum Framework [NCF], 2005).

The National Education Policy 2020 introduced significant reforms in school education by emphasizing experiential learning, competency-based education, conceptual understanding, and learner-centered pedagogy (Ministry of Education, 2020). In response to these reforms, National Council of Educational Research and Training developed the Ganita Prakash mathematics textbooks to promote joyful and activity-based learning in classrooms.

Although Ganita Prakash claims to align with the pedagogical principles of NEP 2020, there is a need to examine whether the textbook effectively incorporates these principles in its content, activities, examples, exercises, and assessment patterns. It is important to analyze whether the textbook truly supports conceptual learning, problem-solving abilities, and active student participation rather than merely presenting revised content in a new format.

Furthermore, limited research has been conducted on the pedagogical structure and classroom applicability of Ganita Prakash textbooks. Therefore, the present study seeks to conduct a pedagogical analysis of Ganita Prakash mathematics textbooks under the framework of NEP 2020 in order to evaluate their effectiveness in promoting meaningful and competency-based mathematics learning.

Objectives of the Study

The present study aims to analyze the pedagogical structure and educational relevance of Ganita Prakash mathematics textbooks in the context of National Education Policy 2020. The specific objectives of the study are as follows:

1. To analyze the pedagogical approaches used in Ganita Prakash mathematics textbooks.
2. To examine the extent to which the textbooks reflect the principles and recommendations of NEP 2020.
3. To study the use of activity-based and experiential learning methods in the teaching of mathematics.
4. To evaluate the effectiveness of the textbook in promoting conceptual understanding and critical thinking among learners.
5. To analyze the integration of real-life applications and problem-solving activities in mathematics learning.
6. To examine whether the textbook supports learner-centered and competency-based

education.

7. To identify the strengths and limitations of Ganita Prakash from a pedagogical perspective.

Research Questions

The study seeks to answer the following research questions:

1. What major pedagogical strategies are used in Ganita Prakash mathematics textbooks?
2. How far do the textbooks align with the recommendations of NEP 2020?
3. Does Ganita Prakash promote conceptual understanding rather than rote learning?
4. How effectively are activity-based and experiential learning methods incorporated in the textbook?
5. Does the textbook encourage critical thinking, reasoning, and problem-solving skills among students?
6. What are the major strengths and challenges of Ganita Prakash in classroom teaching-learning processes?

Review of Literature

The review of literature provides an overview of existing studies related to mathematics pedagogy, textbook analysis, and educational reforms, particularly in relation to the objectives of the present study.

Mathematics education has shifted globally from traditional rote learning approaches toward constructivist and learner-centered models. According to Jean Piaget, learning is an active process in which learners construct knowledge through interaction with their environment. Similarly, Lev Vygotsky emphasized the role of social interaction and scaffolding in cognitive development. These theories strongly support activity-based and experiential learning approaches in mathematics education.

John Dewey further highlighted that meaningful learning occurs through experience and reflection. His experiential learning philosophy forms the foundation of modern pedagogical reforms that encourage learning by doing, especially in subjects like mathematics where abstract concepts can be linked to real-life situations.

In the Indian context, the National Curriculum Framework (NCF, 2005) emphasized the need to reduce rote memorization and promote conceptual understanding in mathematics. It recommended the use of problem-solving, activity-based learning, and contextual teaching methods to make mathematics more meaningful for learners.

The National Education Policy 2020 builds upon these recommendations by promoting competency-based education, experiential learning, and holistic development of learners (Ministry of Education, 2020). It stresses reducing curriculum load while improving understanding through practical and application-based approaches.

In response to these reforms, National Council of Educational Research and Training introduced Ganita Prakash textbooks with the aim of making mathematics more engaging, activity-oriented, and student-friendly. Preliminary observations suggest that these textbooks incorporate real-life examples, puzzles, activities, and competency-based questions, although systematic pedagogical analysis is still required to evaluate their effectiveness.

Several studies in mathematics education have shown that activity-based learning improves students' conceptual understanding and reduces mathematics anxiety (NCERT Reports, 2017; Educational Research Studies, 2019). However, limited research has specifically focused on the pedagogical structure of Ganita Prakash textbooks in the light of NEP 2020, creating a research gap that this study aims to address.

RESEARCH METHODOLOGY

The present study adopts a systematic approach to analyze the pedagogical features of Ganita Prakash mathematics textbooks in the context of National Education Policy 2020. The methodology is designed to examine the nature of instructional strategies, learning activities, and conceptual presentation used in the textbooks.

1. Research Design

The study follows a **qualitative research design**, specifically a **content analysis approach**. This method is appropriate as it allows for an in-depth examination of textbook content, pedagogical patterns, and learning activities.

2. Source of Data

The primary source of data for this study is the **Ganita Prakash mathematics textbooks** developed by National Council of Educational Research and Training. Secondary sources include:

- National Education Policy 2020 document
- National Curriculum Framework (NCF, 2005)
- Research articles and educational journals related to mathematics pedagogy

3. Tools for Data Collection

The study uses the following tools for analysis:

- Textbook content analysis checklist
- Pedagogical indicators framework
- Observation of activities, examples, and exercises

4. Unit of Analysis

The unit of analysis includes:

- Chapters of Ganita Prakash textbooks
- Activities and exercises
- Illustrations and real-life examples
- Assessment questions and problem-solving tasks

5. Parameters of Analysis

The textbook is analyzed on the basis of the following pedagogical parameters:

- Activity-based learning
- Experiential learning
- Conceptual understanding
- Critical thinking and reasoning skills
- Real-life application of mathematics
- Learner-centered approach
- Competency-based assessment

6. Method of Analysis

The collected data is analyzed through **thematic analysis**, where textbook content is categorized according to pedagogical themes and interpreted in the light of NEP 2020 principles.

7. Limitations of the Study

- The study is limited to Ganita Prakash textbooks only.
- It does not include large-scale classroom experimentation.
- Findings are based on qualitative interpretation of textbook content.

Pedagogical Analysis Framework

This section presents the framework used to analyze the pedagogical features of *Ganita*

Prakash mathematics textbooks in alignment with the principles of National Education Policy 2020. The framework helps systematically evaluate how different teaching–learning strategies are embedded in the textbook.

The analysis is based on key pedagogical dimensions derived from constructivist and competency-based learning approaches.

Table 1: Pedagogical Analysis Framework of Ganita Prakash

Pedagogical Aspect	Indicators for Analysis	Expected NEP 2020 Alignment
Activity-Based Learning	Hands-on tasks, group activities, puzzles, explorations	Promotes experiential learning
Experiential Learning	Real-life situations, practical examples, daily-life mathematics	Learning by doing
Conceptual Understanding	Clear explanation of concepts, step-by-step reasoning	Deep understanding over memorization
Critical Thinking	Reasoning questions, open-ended problems	Development of higher-order thinking skills
Problem-Solving Skills	Application-based exercises, word problems	Competency-based education
Learner-Centered Approach	Student participation, discovery-based learning	Shift from teacher-centered methods
Visual Learning Support	Diagrams, charts, illustrations	Better conceptual clarity
Assessment Methods	Competency-based questions, formative assessment tasks	Continuous and holistic evaluation
Inclusiveness	Simple language, accessibility for diverse learners	Equity and inclusion in education

Explanation of Framework

The above framework is designed to evaluate how effectively *Ganita Prakash* incorporates modern pedagogical principles recommended by National Council of Educational Research and Training. Each dimension reflects key expectations of mathematics education reforms introduced under NEP 2020.

- **Activity-Based Learning** ensures that students learn mathematics through doing rather than memorizing formulas.
- **Experiential Learning** connects mathematical concepts to real-life experiences, making learning meaningful.
- **Conceptual Understanding** focuses on clarity of ideas rather than mechanical procedures.
- **Critical Thinking and Problem-Solving** encourage students to analyze, reason, and

apply knowledge.

- **Learner-Centered Approach** shifts focus from teacher explanation to student participation and discovery.
- This framework serves as the basis for the detailed analysis of textbook content in the next section.

Analysis and Findings

The pedagogical analysis of *Ganita Prakash* mathematics textbooks reveals several important features in relation to the principles of National Education Policy 2020 and the framework developed in this study.

1. Activity-Based Learning

The textbook includes a variety of hands-on activities, puzzles, and group tasks that encourage active participation of learners. These activities help students explore mathematical concepts

through doing rather than memorizing. The presence of such tasks indicates a strong shift toward experiential learning as recommended by National Council of Educational Research and Training.

2. Experiential and Real-Life Learning

Many chapters integrate real-life situations such as shopping, measurement, patterns, and daily observations. This helps students connect mathematics with their environment, making learning meaningful and practical. Such integration supports NEP 2020's emphasis on learning by application rather than rote memorization.

3. Conceptual Understanding

The presentation of concepts in *Ganita Prakash* is gradual and structured, allowing students to build understanding step-by-step. Visual representations and examples further support clarity of concepts. This reflects a constructivist approach where learners develop understanding through guided exploration.

4. Critical Thinking and Problem Solving

The textbook includes reasoning-based questions and non-routine problems that encourage students to think beyond standard procedures. These questions help in developing analytical and logical reasoning skills, which are essential goals of competency-based education.

5. Learner-Centered Approach

The instructional design of the textbook promotes student engagement through discovery-based learning. Instead of direct instruction, many sections encourage students to explore patterns, discuss ideas, and arrive at conclusions independently or in groups.

6. Visual and Illustrative Support

Diagrams, illustrations, and visual models are used extensively to simplify abstract mathematical ideas. This visual support enhances comprehension, especially for younger learners and students with diverse learning abilities.

7. Assessment Practices

The assessment pattern includes a mix of objective, descriptive, and application-based questions. This shift from purely procedural testing toward competency-based assessment aligns with the vision of NEP 2020.

8. Inclusiveness and Accessibility

The language used in the textbook is simple and student-friendly. Efforts are made to ensure inclusiveness by providing examples that are relatable to different socio-cultural contexts.

Summary of Findings

The analysis shows that *Ganita Prakash* largely reflects the pedagogical principles of NEP 2020. It emphasizes:

- Activity-based learning
- Conceptual understanding
- Real-life application
- Competency-based assessment

However, the effectiveness of these features in actual classroom implementation may vary depending on teacher practices and classroom conditions.

CONCLUSION

The present study analyzed the pedagogical features of *Ganita Prakash* mathematics textbooks in the context of National Education Policy 2020. The findings indicate that the textbook

represents a significant shift from traditional rote-based mathematics teaching toward a more activity-based, experiential, and competency-oriented approach.

The analysis shows that *Ganita Prakash*, developed by National Council of Educational Research and Training, incorporates several progressive pedagogical elements such as real-life applications, hands-on activities, visual representations, and problem-solving tasks. These features align closely with the goals of NEP 2020, which emphasizes conceptual understanding, critical thinking, and learner-centered education.

It can be concluded that the textbook is effective in promoting meaningful mathematics learning by reducing emphasis on memorization and encouraging exploration and reasoning. The use of activities and contextual examples supports students in developing a deeper understanding of mathematical concepts.

However, the success of these pedagogical innovations depends largely on classroom implementation. Teacher training, availability of resources, and classroom environment play a crucial role in ensuring that the intended objectives of the textbook are achieved effectively.

SUGGESTIONS

Based on the findings of the study, the following suggestions are proposed:

1. Teachers should be trained to effectively use activity-based and experiential learning methods provided in the textbook.
2. More professional development programs should be organized to help teachers implement the principles of NEP 2020 in classroom teaching.
3. Additional digital and interactive resources should be developed to support *Ganita Prakash* learning materials.
4. More real-life contextual examples from different regions should be included to enhance inclusiveness and relatability.
5. Assessment practices should further emphasize reasoning, application, and critical thinking rather than procedural accuracy alone.
6. Schools should ensure adequate classroom infrastructure to support activity-based mathematics learning.

FINAL REMARK

1. Overall, *Ganita Prakash* represents a progressive step toward transforming mathematics education in India by aligning with the vision of NEP 2020. Its pedagogical design has the potential to improve students' understanding and interest in mathematics when implemented effectively.
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