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Reimagining Mathematics Pedagogy through the Panchpadi Approach: A Conceptual Framework for Joyful Learning

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Abstract

Mathematics plays a key role in improving logical, problem solving and critical thinking skills. Many students find mathematics difficult and stressful because of the emphasis on memorising formulas and practicing procedures within the classroom. In order to overcome this, teaching methods should be implemented that connect with students and provide them with an active role. The Panchpadi approach is a 5 stage approach that includes: Aditi (Introduction), Bodh (Conceptual Understanding), Abhyas (Practice), Prayog (Application) and Prasar (Expansion). This paper looks at how Panchpadi can be relevant to mathematics teaching in schools. To make the learning mathematics meaningful and joyful for students, this conceptual framework has been proposed. This paper is conceptual and uses educational literature and curriculum documents to identify the benefits of Panchpadi. This paper does not show how effective Panchpadi can be, but shows a possible framework that teachers, teacher educators and curriculum designers can use to help students learn mathematics meaningfully and enjoyably.

Keywords: Panchpadi, Mathematics Education, Meaningful Learning, Joyful Learning, Conceptual Understanding.

Introduction

Mathematics is a key part of school education as it helps to improve logical thinking, reasoning, problem solving and understanding relationships. It can also be applied to many areas of everyday life such as shopping, measuring, budgeting, building and interpreting information. However, many students find mathematics difficult and become fearful. This can be due to the emphasis placed on explanations, memorising formulas and practicing within mathematics.

To learn mathematics meaningfully there should be opportunities for students to explore mathematical ideas, identify patterns, discuss methods and apply their knowledge to familiar situations. Mathematical proficiency can be broken down into 5 key areas: conceptual understanding, procedural fluency, strategic competence, adaptive reasoning and productive disposition (National Research Council, 2001). This shows that when students learn mathematics successfully they will develop conceptual understanding, skills, reasoning and a positive attitude towards mathematics.

The National Education Policy 2020 states that conceptual understanding, critical thinking, problem solving and experiential learning are key learning outcomes (Ministry of Education, 2020). The national curriculum framework for school education (NCFSE) 2023 also emphasises that mathematics should be taught using concrete experiences, progressing to language, pictures, diagrams and abstract symbols (National Council

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of Educational Research and Training (NCERT), 2023). This is important as students often understand mathematical concepts better when they can link abstract concepts to meaningful experiences.

The Panchpadi approach provides meaningful structure to lessons. It includes the 5 stages: Aditi, Bodh, Abhyas, Prayog and Prasar. This is included in the national curriculum framework for the foundational stage (NCFFS) 2022 and national curriculum framework for the secondary stage (NCFSE) 2023 as a possible framework for planning teaching and learning. Although this is not specifically mentioned in relation to mathematics within the curriculum framework, it can be meaningfully linked. This paper proposes a conceptual framework based on the Panchpadi approach to help make mathematics more experiential, active and enjoyable in schools.

Need and Significance of Study

A key issue with mathematics education is the lack of understanding of why certain procedures are needed. Students may learn to apply formulas but may not understand how or when to use them. This can cause issues when they are faced with unfamiliar problems. Conceptual and procedural knowledge are closely linked and should be developed through interaction during mathematics learning (Rittle-Johnson, 2019). Therefore, conceptual understanding and procedural practice should not be separate goals.

The NCFSE 2023 states that mathematics should not be taught with a focus on rote learning and abstract symbols. It emphasises that concrete experiences, discussion, pictures and diagrams should be used before introducing mathematical symbols (NCERT, 2023). It also recognises the importance of using locally available teaching and learning resources and appropriate digital resources to help with mathematical exploration. This shows the need for an active classroom environment. The Panchpadi is significant as it provides a structured framework for teachers to link previous knowledge, conceptual understanding, practice, application and sharing. It may also help teachers plan activities that encourage curiosity, collaboration and reflection. This paper explores how the stages can be adapted for middle and secondary school mathematics.

Objectives of the Paper

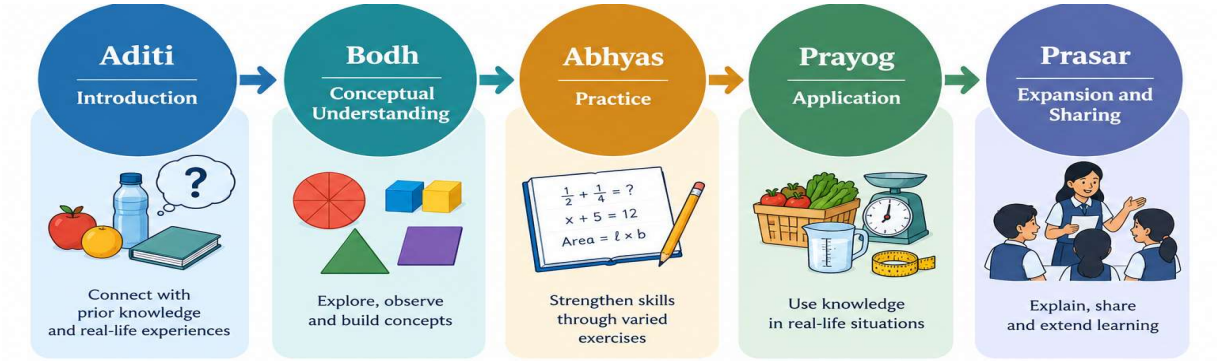
This paper will explore how the Panchpadi approach can be relevant to mathematics education in schools. It will look at how the 5 stages can be linked to meaningful mathematics learning. A conceptual framework has been proposed to help incorporate the Panchpadi approach into teaching. An example of how the stages can be applied to some mathematical topics has also been provided. Finally, the possible implications for teachers will be discussed.

Methodology

This paper is conceptual and analytical. It uses a review of relevant educational literature and national curriculum documents. This includes the NEP 2020, NCF-FS 2022 and NCF-SE 2023. Mathematical proficiency, conceptual understanding, problem solving and mathematics pedagogy have been looked at to see how they can link to the 5 stages.

Analysis has been used to create a proposed framework. Examples have been created for fractions, linear equations and geometry to show how the stages can be applied. No primary data has been collected from students or teachers. Therefore, this is a conceptual framework that would need to be investigated further in the classroom.

Panchpadi Approach – Meaning and Educational Relevance



The Panchpadi approach is a 5 stage approach that can be used as a guide for planning teaching. The stages include Aditi (Introduction), Bodh (Conceptual Understanding), Abhyas (Practice), Prayog (Application) and Prasar (Expansion).

The stages help learners to become familiar with a topic, understand it, develop their understanding, apply it to everyday situations and share/expand upon their knowledge (NCERT, 2022, 2023). Aditi links new concepts to previous knowledge. For example, when teaching fractions, a teacher may begin by asking students how they would share a pizza/roti into equal parts.

This helps to create a familiar starting point. Bodh focuses on developing conceptual understanding. Students should be encouraged to explain what they can see and why there is a relationship. For example, students could use paper folding or fraction strips to explore equivalent fractions.

Abhyas helps students to develop their understanding. A variety of questions, activities and collaborative tasks can be used. Whilst practice is important to develop accuracy and fluency, they should be linked to understanding. Prayog encourages students to apply their mathematical knowledge to everyday situations. Prasar helps students to expand their learning by explaining, discussing, peer teaching and independent exploration. Explaining a concept to others helps students to structure their understanding.

These stages can provide a possible framework for students to move from familiar situations to conceptual understanding. However, they do not need to be strictly followed. Teachers may move back to previous stages depending on student needs and topic.

Conceptual Underpinning of Framework

This framework is linked to the constructivist and experiential approach to learning. Constructivism is focused on learners developing their understanding by linking new information with their existing knowledge and experiences. Within mathematics, students should be given opportunities to explore patterns, discuss strategies and create explanations.

This framework is also linked to the idea of moving from concrete to abstract. Bruner (1966) identified 3 ways of representing information: enactive, iconic and symbolic. This can be linked to mathematics by using concrete materials, pictures/diagrams and mathematical symbols.

For example, students may use fraction strips, draw fraction diagrams and then write equivalent fractions using symbols. The NCF-SE 2023 also recommends that concrete experiences should be used before language, pictures and mathematical symbols to develop conceptual understanding (NCERT, 2023).

The National Research Council (2001) also explained that mathematical proficiency includes understanding, procedural fluency, problem solving, reasoning and a productive disposition for mathematics. The 5 stages can be used to plan activities to support these areas. However, this is a proposed interpretation of how Panchpadi can be used in mathematics pedagogy.

Panchpadi Based Framework for Mathematics Learning

This framework links each stage to a specific purpose within mathematics. This can help to create a meaningful learning process for students.

Table 1. Panchpadi Based Framework for School Mathematics

Stage	Main purpose	Suggested mathematics classroom activity
Aditi (Introduction)	Connect new concepts with prior knowledge	Discuss familiar examples, ask questions and introduce real-life situations
Bodh (Conceptual Understanding)	Develop meaning and understanding	Use manipulatives, diagrams, exploration and group discussion
Abhyas (Practice)	Strengthen understanding and skills	Solve varied problems, puzzles and collaborative exercises
Prayog (Application)	Connect mathematics with everyday life	Use mathematical concepts in practical tasks and small projects
Prasar (Expansion)	Extend and communicate learning	Explain solutions, teach peers, present findings and explore related problems

This framework should be flexible. Depending on the mathematical concept, student understanding and resources available, teachers may move between stages. For example, if students are struggling during practice they may return to concrete materials or diagrams to develop conceptual understanding.

Examples of Application in School Mathematics

The following examples show how Panchpadi can be incorporated into some topics in middle and secondary school.

Example- 1. Fractions (Class VI)

While teaching fractions, familiar objects can be used. During Aditi, students could be asked how they would share a roti between 4 people. During Bodh, students can fold paper circles or use fraction strips to represent 1/2, 1/3 and 1/4. Students can compare representations and explore why 2 fractions may have the same value. During Abhyas, students can answer questions on equivalent fractions and compare fractions using diagrams and numbers. During Prayog, students can create a simple sharing plan for food items or share a quantity between family members. During Prasar, students can explain their methods to their peers and create a chart showing different ways of representing the fractions. This can help students to link visual understanding to symbolic.

Example-2. Linear Equations (Class VIII)

While teaching linear equations, situations can be used with unknown amounts. During Aditi, students could be given a situation where a student has some money and receives an extra 5 rupees. They now have 12 rupees. During Bodh, students can use counters, balance model or simple diagrams to represent the unknown amount. They can discuss why they can subtract 5 from both sides to keep the equation balanced. During Abhyas, students can solve equations such as (x+5=12), (2x=16) and (3x+2=14). They should explain their steps. During Prayog, students can create simple problems based on shopping, saving and ticket prices. During Prasar, students can explain different methods of solving and discuss why they get the same answer. This can help to develop algebraic reasoning.

Example-3. Area of a Rectangle (Class VII)

While teaching area, familiar objects can be used. During Aditi, students could estimate which surface has a larger area. During Bodh, students can cover rectangular shapes using unit squares. They can notice how the number of rows and columns affects the area. This will help them to realise that the area of a rectangle can be found by multiplying length x breadth. During Abhyas, students can calculate the area of different rectangles and complete related questions. During Prayog, students can measure the area of a wall, cover of a notebook or study table. During Prasar, students can explain how they measured and compare different methods of finding the area. This helps to link formulas to measuring.

Discussion

This framework suggests that Panchpadi can provide a meaningful framework for teaching mathematics. The key benefit of this framework is that it links previous knowledge, conceptual understanding, practice, application and sharing. This is important as students need to understand mathematical relationships and use them to solve problems.

This framework also links to the focus on experiential and competency based learning within the national curriculum documents. The Panchpadi approach is described as a possible framework for planning teaching (NCERT, 2023). The NCF-SE 2023 also emphasises the importance of concrete experiences (NCERT, 2023). Santos-Trigo (2024) also highlights the importance of representations, tools, exploration and reasoning when solving mathematical problems. This shows how important it is to design learning experiences that allow students to explore and share their mathematical understanding.

A key benefit of this framework is that it can help make mathematics more active for students. Using paper folding, measuring, group problem solving and peer teaching can give students opportunities to be actively involved. Enjoyable learning should not be seen as just fun and games. It should be meaningful and involve students being curious, confident to ask questions and feel a sense of achievement when they understand a mathematical concept.

Teachers play a key role. They will need to choose appropriate activities, ask questions to encourage reasoning and provide support based on student needs. Technology can be used where appropriate to help visualise graphs, shapes and patterns. However, the NCF-SE 2023 does highlight that technology cannot improve learning on its own. It should be used to support teachers and students and issues surrounding access and the digital divide should be considered (NCERT, 2023).

Implications for Teaching

This framework can help maths teachers design lessons that begin with familiar situations and help students develop understanding of abstract mathematical concepts. It encourages teachers to use locally available resources, real-life situations, group activities and opportunities for students to explain their thinking. It can also help teachers to use formative assessment throughout the lesson.

This approach can help students to be more involved, explore, practice and share their mathematical understanding. It can encourage students to link mathematics to real-life situations and realise that there are multiple ways to solve a problem. This framework can help teacher educators to prepare pre-service and in-service teachers to design experiential and learner centred mathematics lessons. It can also be considered by curriculum designers when creating activity based learning resources.

Limitations and Further Research

This paper is conceptual and does not provide any evidence of how effective Panchpadi can be in mathematics classrooms. The activities suggested have not been trialled. They may not be suitable for all ages, previous knowledge, language, class sizes, resources and teacher preparation. In addition, all 5 stages may take more planning and time.

Further research could look at how Panchpadi can be implemented in middle and secondary school mathematics. Experimental and action research could be carried out to see how it links to conceptual understanding, problem solving, and active learning and student attitudes towards mathematics. Researchers could look at teachers' experiences, create observation tools and compare Panchpadi based lessons to other activity based approaches. This would help to identify when this framework would be useful and any issues teachers may face.

Conclusion

Mathematics should be taught with the aim of improving understanding, reasoning, problem solving and a positive disposition towards mathematics. If students are only taught through memorisation and practicing, they may not have opportunities to link mathematical concepts. The Panchpadi approach can help with this as it provides a 5 stage framework that can be adapted.

This paper has proposed a conceptual framework that can help teachers incorporate Panchpadi into teaching mathematics in schools. Examples have been provided for fractions, linear equations and geometry to show how teachers can link classroom learning to familiar situations. This framework does not claim that Panchpadi has been proven to help improve mathematics achievement or reduce mathematics anxiety. However, it provides a teaching possibility that would benefit from being investigated systematically in the classroom. If thoughtfully implemented it can help create mathematics classrooms where students are encouraged to solve problems, understand, explore, apply and share their mathematical understanding.

References

Bruner, J. S. (1966). Toward a theory of instruction. Harvard University Press.

Ministry of Human Resource Development. (2020). National education policy 2020. Government of India. https://static.pib.gov.in/WriteReadData/userfiles/NEP_Final_English_0.pdf

National Council of Educational Research and Training. (2022). National curriculum framework for the foundational stage. https://ncert.nic.in/pdf/focus-group/NCF-FS_2022EN.pdf

National Council of Educational Research and Training. (2023). National curriculum framework for school education 2023. https://ncf.ncert.gov.in/webadmin/assets/b27f04eb-65af-467f-af12-105275251546

National Research Council. (2001). adding it up: Helping children learn mathematics. The National Academies Press. https://doi.org/10.17226/9822

Rittle- Johnson, B. (2019). Iterative development of conceptual and procedural knowledge in mathematics learning and instruction. In J. Dunlosky & K. A. Rawson (Eds.), The Cambridge handbook of cognition and education (pp. 124-147). Cambridge University Press. https://doi.org/10.1017/9781108235631.007

Santos-Trigo, M. (2024). Problem solving in mathematics education: Tracing its foundations and current research-practice trends. ZDM–Mathematics Education, 56, 211-222.https://doi.org/10.1007/s11858-024-01578-8

Smith, M., Bill, V., & Raith, M. L. (2018). Promoting a conceptual understanding of mathematics. Mathematics Teaching in the Middle School, 24(1), 36–43. https://doi.org/10.5951/mathteacmiddscho.24.1.0036