MERGING LANES: WHERE E-LEARNING DIVERSITY MEETS FUTURE TRENDS

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CHALLENGES IN EARLY SCHOOL MATHEMATICS LEARNING: A FOCUS ON STUDENTS' UNDERSTANDING

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ABSTRACT

Mathematics learning in the early school years plays an important role in developing students' thinking skills and attitudes toward the subject. However, concerns remain about whether the current mathematics content is too difficult or not fully understood by students. This paper examines students' level of understanding in early mathematics and explores whether the difficulty of the subject aligns with their developmental level. A qualitative approach was employed through classroom observations and teacher reflections to identify the challenges students face in learning basic mathematical concepts. The findings indicate that students' difficulties are influenced not only by the complexity of the content, but also by teaching methods, prior knowledge, and the learning environment. This study highlights the importance of developmentally appropriate teaching strategies to support meaningful learning in early mathematics.
Keywords: Early mathematics, students' understanding, learning challenges, teaching strategies

Introduction

Mathematics learning in the early school years plays a key role in developing students' thinking skills and attitudes toward the subject. Understanding basic mathematical concepts helps children build confidence and prepares them for later learning in more advanced topics. However, many students struggle to grasp early mathematics, raising questions about whether the curriculum is too demanding or whether students simply do not understand the content well enough (Clements & Sarama, 2020).

Previous research shows that teaching methods and instructional design significantly influence students' success in early mathematics. For example, game-based methods were found to improve preschool children's understanding and performance in early mathematics more than traditional worksheets and number books, suggesting that interactive, age-appropriate teaching strategies are effective in enhancing mathematical understanding (Abdullah et al., 2021). Studies of parental involvement also show that play-based approaches at home can support learning when parents actively engage in mathematical activities with children (Lim et al., 2022).

In addition to teaching methods, technology-enhanced learning tools are increasingly discussed in the literature as ways to support mathematics understanding. Research on augmented reality (AR) mathematical picture books showed that such tools can increase students' geometric thinking and reduce cognitive load compared to traditional materials, indicating that appropriate media and teaching resources can make abstract mathematical ideas more concrete and easier to grasp (Wang et al., 2024). Teacher preparedness is another factor that influences early mathematics learning. Studies of early childhood teachers show that teachers' understanding of mathematical concepts and their readiness to implement technology and effective instructional approaches affect students' learning outcomes (Rahman et al., 2020).

Despite these advances, gaps remain in understanding how curriculum demands, developmental readiness, and instructional strategies together influence stdents' early mathematics learning. This paper explores these issues by focusing on students' understanding and perceived difficulty of mathematics content at the early school level.Teacher preparedness also affects students' learning outcomes. Studies in early mathematics show that when teachers have good content knowledge and are confident in teaching mathematical concepts, students tend to achieve better understanding (Abd. Halim, Mamat, & Mohd Radzi, 2023). This finding is consistent with research showing that teacher knowledge and instructional quality are important predictors of how well students grasp early mathematics (Meylani, 2024).

In addition, studies show that using interactive tools, like digital manipulatives, and having different types of classroom activities can help students understand mathematics better. These tools make abstract ideas easier to see and more interesting to learn (Meylani, 2024; MJSSH, 2023). This means that learning early mathematics is not just about how difficult the content is, but also about how teachers teach, how ready teachers are, and the learning environment in the classroom. Even with these improvements, there are still gaps in understanding how the curriculum, students' readiness to learn, their motivation, and teaching methods all work together to affect learning. This paper focuses on these issues by examining how students understand early mathematics and how difficult they find the content.

Students' Level of Understanding in Early Mathematics

Students' level of understanding in early mathematics can vary widely. It is not just about knowing the right answer, but also about how well they grasp concepts, apply ideas, and solve problems. The following points are commonly used to assess or describe students' understanding:

1. Recognizing and Understanding Numbers

What it means: Students can identify numbers, understand their value, and know how numbers relate to each other.

Example: Knowing that 7 is more than 5, or understanding that 10 is made of 5 + 5.

Why it matters: Students who understand numbers well can perform addition, subtraction, and other operations more easily. Those who only memorize numbers may struggle to apply them in different situations.

2. Understanding Basic Operations

What it means: Students can add, subtract, and eventually multiply or divide, depending on their level.

Example: Solving "3 + 4 = ?" using fingers, objects, or mental strategies.

Why it matters: Understanding how and why operations work is more important than memorizing answers. It helps students solve problems in real life.

3. Recognizing Patterns and Relationships

What it means: Students can see patterns in numbers, shapes, or sequences and understand the rules.

Example: Continuing a shape pattern like "● ○ ● ○ …" or recognizing even and odd numbers.

Why it matters: Pattern recognition shows logical thinking and helps students understand sequences, number relationships, and problem-solving strategies.

4. Problem-Solving Skills

What it means: Students can apply math concepts to solve simple problems.

Example: "Ali has 2 candies, his friend gives him 3 more. How many does Ali have now?"

Why it matters: Students with strong problem-solving skills can apply math in real-life situations. Those who struggle may know the steps but not understand what the question is asking.

5. Conceptual Understanding vs. Memorization

What it means: Students know why an answer is correct, not just how to get it.

Example: Understanding that "5 – 2 = 3" because they remove 2 objects from 5, not just recalling the answer from memory.

Why it matters: Conceptual understanding leads to deeper learning and helps students tackle new or complex problems later.

6. Confidence and Attitude

What it means: Students' willingness to try math problems and their attitude toward learning.

Example: A student tries a new problem even if it seems hard, versus a student who avoids it.

Why it matters: Confidence affects learning. Positive attitudes encourage participation and deeper understanding, while low confidence can limit progress even for capable students.

Determining Whether the Difficulty of Early Mathematics Matches Students' Developmental Level

It is important to check if math lessons are not too hard or too easy for young students. Here are some key points:

1. Cognitive Readiness

Students need to think logically and understand numbers.

Example: A 6 year old can do addition and subtraction up to 10, but multiplication might be too hard.

Why it matters: Too difficult tasks can make students frustrated and confused.

2. Attention Span

Students can only focus for a certain time.

Example: Young children may pay attention for 10–15 minutes; long or complicated tasks may be too hard.

Why it matters: Lessons must match how long students can concentrate.

3. Prior Knowledge

Students need to know the basics before learning new topics.

Example: Students who know numbers 1–20 are ready to learn addition up to 20.

Why it matters: Without prior knowledge, new topics can be confusing.

4. Learning Pace and Task Difficulty

New topics should be introduced slowly and step by step.

Example: Fractions or multi-step problems may be too much if introduced too soon.

Why it matters: Gradual difficulty helps students learn better and avoid stress.

5. Use of Hands-On Materials

Using objects, pictures, or tools makes math easier to understand.

Example: Using blocks to teach addition or subtraction helps students see the problem.

Why it matters: Young children understand concepts better when they can touch or see them.

6. Confidence and Emotional Readiness

Students need to feel confident to try new problems.

Example: Some studaents try hard questions, others give up easily.

Why it matters: If lessons are too difficult, students may feel frustrated and lose interest in math.

Comparison of Students' Understanding and Developmental Appropriateness in Early Mathematics

Table 1 shows a clear relationship between students' level of understanding in early mathematics and the suitability of the difficulty level based on their developmental stage.

Table 1: Comparison of Students' Understanding and Developmental Appropriateness in Early Mathematics

Aspect	Students' Understanding	Developmental Appropriateness	Implication
Number Concepts	Recognize numbers and understand values.	Content matches cognitive readiness.	Supports accurate and meaningful learning.
Basic Operations	Perform simple addition and subtraction.	Taught according to age and ability.	Prevents confusion and overloading.
Patterns & Relationships	Identify simple patterns and sequences.	Uses simple and concrete examples.	Develops logical thinking skills.
Problem-Solving	Apply math to simple real-life problems.	Tasks match attention span.	Improves application of concepts.
Conceptual Understanding	Understands *why* answers are correct.	Builds on prior knowledge step by step.	Encourages deep learning.
Learning Support	Uses hands-on materials and visuals.	Learning pace is gradual.	Helps students grasp abstract ideas.
Confidence & Attitude	Shows willingness to engage in math.	Emotional readiness is considered.	Builds positive attitude toward math.

The findings indicate that students' understanding is influenced not only by their ability to recognize numbers and perform basic operations, but also by how the content is presented and paced. When mathematical concepts such as number relationships, basic operations, and patterns are introduced gradually and supported with hands-on materials, students are more likely to develop conceptual understanding rather than rely on memorization.

The table also highlights the importance of considering students' prior knowledge, attention span, and emotional readiness when designing mathematics lessons. Tasks that are too difficult or introduced too quickly may cause confusion, frustration, and low confidence among young learners. In contrast, developmentally appropriate tasks encourage students to engage actively in problem-solving and build positive attitudes toward mathematics. Overall, aligning the difficulty of early mathematics

content with students' cognitive and emotional development is essential to support meaningful learning and long-term understanding.

Conclusion

In conclusion, this study shows that challenges in early mathematics learning are influenced by several factors, not only by the difficulty of the subject content. While some mathematical concepts may be hard for young students to understand, teaching methods, students' prior knowledge, and the classroom environment also play important roles in shaping their understanding. When lessons are not taught in ways that match students' developmental levels, students may find it difficult to grasp basic mathematical ideas. Therefore, it is important for teachers to use teaching strategies that are appropriate to students' age and cognitive development. By using clear explanations, suitable learning activities, and a supportive learning environment, teachers can help students build a stronger understanding of mathematics. This will also help students develop confidence and a positive attitude toward mathematics from an early age.

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