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Challenges in Mathematics Teaching and Learning in Arab Schools in Israel: Perspectives of Students and Teachers

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ABSTRACT

Mathematics is fundamental to academic development and provides access to a wide range of scientific and professional fields. Nevertheless, mathematics teaching and learning are complex processes that depend on effective communication, appropriate mathematical language, accurate use of symbols, and mastery of discipline-specific terminology. This study investigated the difficulties Grade 10 students encounter when learning mathematics in Arab schools in Israel and examined mathematics teachers' perceptions of these challenges. It also sought to propose pedagogical recommendations for improving mathematics instruction and supporting student learning. Data were collected using two questionnaires containing both open-ended and closed-ended questions. The participants comprised 200 Grade 10 students and 15 mathematics teachers. The findings revealed recurring difficulties related to understanding abstract concepts, interpreting spatial, directional, and temporal relationships, recalling, reading, and writing numbers, and avoiding procedural errors such as reversals, omissions, transpositions, substitutions, and additions. Teachers' responses further highlighted the influence of mathematical language, instructional practices, learning strategies, and students' beliefs on their engagement with and understanding of mathematics. Based on these findings, the study recommends adopting more explicit, diagnostically informed, and language-sensitive teaching practices that address students' conceptual and procedural difficulties. The study provides context-specific evidence that may inform instructional practices and educational interventions in Arab schools in Israel.

KEYWORDS: Mathematics Learning Difficulties; Arab Schools In Israel; Mathematical Language; Instructional Practices; Student Beliefs; Learning Strategies

INTRODUCTION

Effective mathematics teaching and learning depend on meaningful communication between teachers and students. Mathematical language involves constructing, interpreting, and communicating mathematical meaning through contextually appropriate language, rather than merely recognizing or responding to isolated words (Mulwa, 2015). Communication may become particularly challenging when teachers and students differ in their linguistic backgrounds or in their command of mathematical terminology. Examining such communication barriers is therefore essential for understanding the factors contributing to students' low achievement in mathematics (Jiromaru et al., 2015; Hibi, 2017; Hibi, 2018; Hibi, 2020; Hibi, 2022a; Hibi, 2025a).

Identifying how and why students experience difficulties in learning mathematics is an important prerequisite for developing effective educational interventions. Accordingly, mathematics education should be designed to anticipate and address potential learning barriers, rather than merely providing support after difficulties have emerged (Hibi, 2025b; Hibi, 2025c; Scherer et al., 2017). Such an approach requires a comprehensive educational framework that supports students' conceptual understanding, procedural competence, mathematical communication, and ability to apply knowledge in different contexts.

Mathematics learning involves several interrelated processes, including concept acquisition, principle learning, reasoning, and problem-solving. These processes require sustained cognitive engagement,

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particularly because mathematical knowledge is often abstract and because mathematical concepts and procedures are closely interconnected. The factors influencing mathematics learning can broadly be classified into three categories: individual, instructional, and demographic factors. Demographic factors include students' gender and their parents' educational level, whereas instructional factors encompass teaching methods, strategies, and classroom practices. Individual factors include students' arithmetic abilities, concentration, motivation, and capacity for self-directed learning (Hibi, 2025e; Hibi, 2025f; Hibi, 2025g).

Against this background, the present study aims to examine the factors influencing mathematics learning and identify the principal difficulties students encounter in this process. It also investigates teachers' perceptions of students' mathematics learning difficulties. Based on the findings, the study proposes practical recommendations for strengthening mathematics teaching practices and improving students' learning experiences and mathematical achievement.

RELATED WORKS

Research has identified several factors that influence students' mathematics achievement and should therefore be considered when designing effective instruction. Based on the views of students enrolled in a mathematics department, instructional methods and strategies, teachers' motivation and engagement, and teachers' mathematical competence emerged as three major factors affecting instructional design and learning outcomes. These findings underscore the importance of developing alternative instructional approaches and innovative learning strategies to enhance the quality and effectiveness of mathematics education (Hibi, 2025c; Hibi, 2025d; Tuncay Saritas & Omur Akdemir, 2009).

Related research conducted among students in Libya examined the factors associated with mathematics achievement. The findings indicated that students' attitudes toward mathematics received the lowest rating among the factors examined, whereas teacher-related attribution received the highest. These results may help teachers identify weaknesses in their instructional practices and assist educational institutions in developing professional-development programs aimed at improving teaching effectiveness and student achievement (Hibi, 2021a; Hibi, 2022b; Hibi, 2024b; Hibi, 2024c; Mohamed Al-Agili et al., 2012).

The mathematics achievement of first-year secondary-school students in Central Uganda has also been examined at both the school and classroom levels. The findings identified parental support, classroom climate, assessment practices, students' perceptions of mathematics achievement, peer influence, gender, and socioeconomic status as particularly influential factors. However, the study had several methodological limitations. The measurement of mathematics teaching quality was insufficiently specified, and the limited set of variables measured at the school and classroom levels restricted the study's ability to explain differences in classroom effectiveness and student outcomes. The researchers therefore recommended assessing the performance of girls and boys across diverse areas of mathematics (Kiwanuka et al., 2015).

Other studies have investigated efforts to improve students' mathematics achievement in accordance with lesson-based and competency-based secondary-school curricula. In particular, the effectiveness of multiple innovative teaching models was examined as a means of strengthening students' mathematical achievement. The findings suggested that instructional innovations incorporating web-based resources and social media could enhance students' ability to understand mathematical concepts (Hibi & Khalifa, 2020). Contextual mathematics instruction was also found to be more effective than conventional teaching, with significant differences observed among the instructional models examined (Hibi, 2021c; Hibi, 2021d; Hibi, 2022c; Hibi, 2022d; Sidabutar, 2016).

Game-based learning environments represent another promising approach to promoting students' interest and achievement in mathematics. One example is *Math Island*, a management and construction game that integrates mathematical knowledge and curriculum content into its game mechanisms. The findings showed that students who used the learning environment achieved better results on word problems and calculation

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tasks than students in the control group. Participants in the experimental group also demonstrated greater interest in mathematics. Nevertheless, the design requires further attention to the difficulty, quantity, and diversity of its mathematical content (Hibi, 2021b; Hibi, 2021f; Hibi, 2022e; Hibi, 2022f; Yeh et al., 2019).
The growing use of online instruction has also prompted research into how mathematics educators perceive and implement online teaching at the undergraduate level. A review of teaching communities examined variations among instructional modalities and the ways in which technological sophistication and the abstract nature of mathematics shape the development of effective online learning environments. The review emphasized the importance of avoiding rigid distinctions between pedagogical approaches and of taking advantage of the distinctive educational affordances offered by digital media and emerging technologies (Hibi, 2022g; Hibi, 2024a; Hibi, 2024d; Hibi, 2024e; Trenholm & Peschke, 2020).

METHODOLOGY

The study employed a descriptive research design and included 200 Grade 10 students and 15 mathematics teachers. The student sample consisted of 98 boys and 102 girls. The teacher sample comprised seven men and eight women, whose teaching experience ranged from 2 to 25 y Two separate questionnaires were developed for data collection: one for the students and another for the mathematics teachers. Both instruments included open-ended and closed-ended questions.

The student questionnaire was designed to identify the difficulties students encountered when learning mathematics. The teacher questionnaire examined teachers' perceptions of students' mathematics learning difficulties and covered three principal dimensions: (1) the learning environment and students' affective and cognitive characteristics; (2) difficulties encountered in teaching mathematics; and (3) the strategies and instructional approaches used in mathematics teaching.

The questionnaires were administered separately to the participating students and teachers. All participants were given 45 minutes to complete their respective questionnaires. The same administration conditions were maintained to ensure consistency in the data-collection process.

Responses to the closed-ended questions were analyzed using percentages to determine the distribution of participants' responses across the questionnaire items. Students' and teachers' responses were subsequently compared to identify similarities and differences between their perceptions of the difficulties associated with mathematics teaching and learning. Responses to the open-ended questions were used to provide further insight into the difficulties reported by the participants and to complement the quantitative findings.

RESULTS

The first stage of the analysis focused on teachers' perceptions of the factors contributing to students' difficulties in learning mathematics. The teachers evaluated 15 potential factors encompassing two broad dimensions: the management of the learning environment and students' affective and cognitive characteristics. Among the factors examined, a lack of prerequisite mathematical knowledge and insufficient student effort were perceived as the most influential contributors to mathematics learning difficulties. Table 1 summarizes the teachers' responses across all 15 factors.

Table 1: Reasons got out of perceptions of the teachers about mathematical learning and complexities by the students.

Sl. No.	Reasons for complexities of students in mathematics learning	Mean Value on 5-point scale
1	Complexity in varying questions in the mathematical forms.	4.71(0.94)
2	Absence of self efficacy.	4.64(0.94)
3	Complexity in identifying the principles of mathematics.	4.5(0.9)

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4	Learning slowly the mathematical concepts.	4.5(0.9)
5	Do not have the ability to connect varying topics.	4.43(0.89)
6	Complexity in following the mathematics class.	4.43(0.89)
7	Absence of teamwork.	4.36(0.87)
8	Absence of time management.	4.36(0.87)
9	Complexity in understanding the mathematical questions.	4.36(0.87)
10	Lack of interest of the students in mathematics.	4.36(0.87)
11	Absence of mind in the classroom.	4.36(0.87)
12	Resistance to get assistance from friends or teachers.	3.81(0.76)
13	Absence of exiting mathematical knowledge.	3.13(0.63)
14	Absence of needed practice by the students.	3.36(0.67)
15	Inability to adapt to new technological learning.	3.30(0.66)

Many teachers perceived students as not investing sufficient effort in learning mathematics, managing their study time effectively, or seeking assistance when difficulties arose. These behaviors were therefore identified as important factors contributing to students' mathematics learning difficulties. From the teachers' perspective, mathematics instruction was further complicated by large class sizes, students' difficulty in rapidly understanding mathematical concepts, and their lack of prerequisite mathematical knowledge.

The subsequent stage of the analysis focused on students' perceptions of their own mathematics learning experiences. Their responses were examined across five principal themes: perceived difficulties in learning mathematics, mathematics self-efficacy beliefs, perceptions of teachers' mathematics instruction, motivation to learn mathematics, and help-seeking behavior. These themes provided the framework for analyzing the difficulties reported by the participating students.

The following figure indicates the perceptions of the teachers about mathematical learning and complexities by the students.

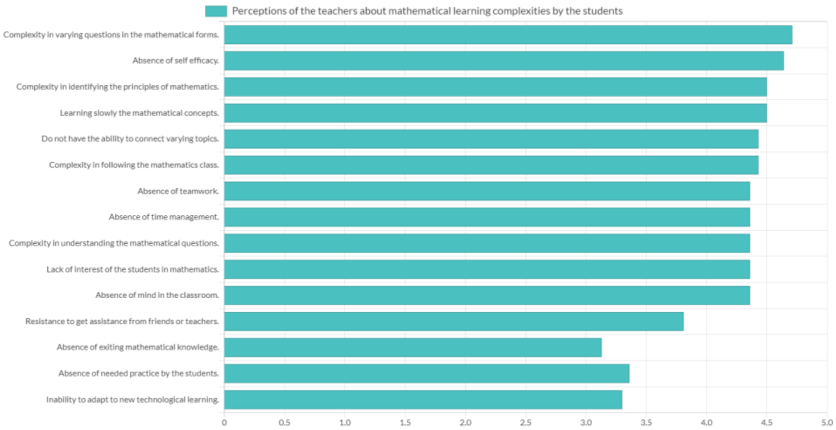

Figure 1: Perceptions of the teachers about mathematical learning and complexities faced by the students.

Perceptions of the students regarding the complexities in learning mathematics

Table 2 represents the perceptions of the students regarding complexities in learning mathematics.

Sl. No.	Reasons for complexities in learning mathematics by students	% of response
1	Forgetting mathematics learning materials	52.1%
2	Rapidly forgetting mathematical formulae	21.2%

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3	Less ability to learn	7.3%
4	Toughness of mathematics	11.2%
5	Complexity in understanding mathematics	8.2%

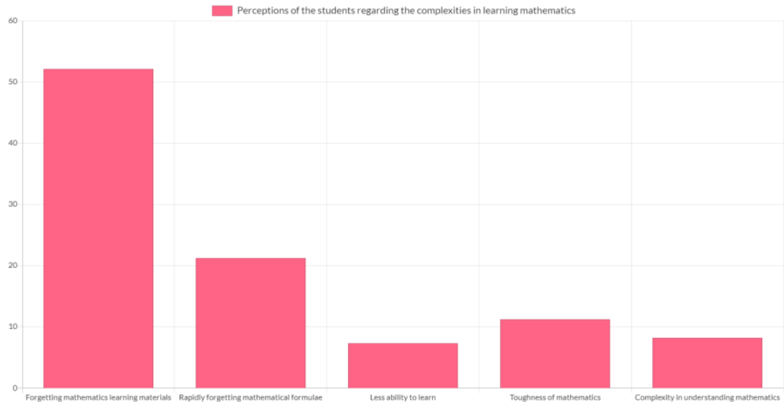

Figure 2: Perceptions of the students regarding the complexities in learning mathematics

Forgetting previously learned mathematical content was the most frequently reported difficulty, identified by 52.1% of the students. The second most common difficulty was rapidly forgetting mathematical formulas (21.2%), followed by perceiving mathematics as a difficult subject (11.2%), experiencing difficulty understanding mathematical concepts (8.2%), and not knowing how to study mathematics effectively (7.3%). Together, these findings suggest that problems related to the retention and understanding of mathematical knowledge were more prominent than difficulties associated with study strategies or general perceptions of the subject. Figure 2 presents the distribution of students' responses regarding their mathematics learning difficulties.

Perceptions of the students regarding easiness in learning mathematics based on instructions given by the teachers

Table 3 indicates the reasons based on perceptions of the students regarding the easiness in learning mathematics.

Sl. No.	Reasons for easiness in learning mathematics by students	% of response
1	Learning mathematics is easy and also easy to understand.	25.81%
2	Quality instruction is given by the mathematics teachers.	17.19%
3	Practice makes mathematics learning easier.	33.56%
4	Instructions of teachers are essential in easing learning in mathematics.	23.45%

Among the factors perceived as facilitating mathematics learning, regular practice in solving mathematical problems was the most frequently reported, accounting for 33.56% of the students' responses. A further 25.81% indicated that mathematics was generally easy to learn and understand, while 23.4% emphasized that high-quality instruction from teachers played an important role in making mathematics more accessible. However, only 17.19% expressed a positive perception of the quality of the mathematics instruction they currently received. This relatively low percentage suggests a need to strengthen instructional quality and provide students with clearer and more effective learning support. The following figure presents the distribution of students' perceptions of the factors that make mathematics easier to learn.

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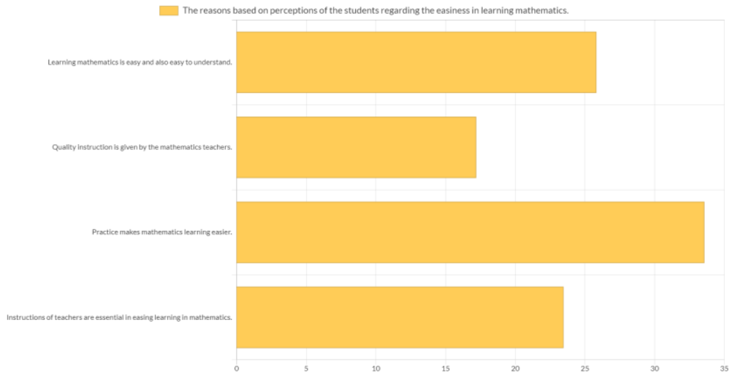

Figure 3: The reasons based on perceptions of the students regarding the easiness in learning mathematics.

Perceptions of the students about the gender and motivational beliefs

This section deals with the perceptions of the students about the gender and motivational beliefs associated with the high complexity in learning mathematics. Table 3 indicates the perceptions of the students about the gender associated with the high complexity in learning mathematics.

Table 3: Perceptions of the students about the gender associated with the high complexity in learning mathematics

Sl. No.	Gender	% of response
1	Male	64.4%
2	Female	35.5%

The descriptive findings revealed a gender-related difference in students' perceived mathematics learning difficulties. A greater proportion of boys (64.4%) reported experiencing substantial difficulty in learning mathematics than girls (35.5%). Students' perceptions of these difficulties were also examined in relation to four motivational dimensions: effort, interest, perceived task value, and mathematics self-efficacy.

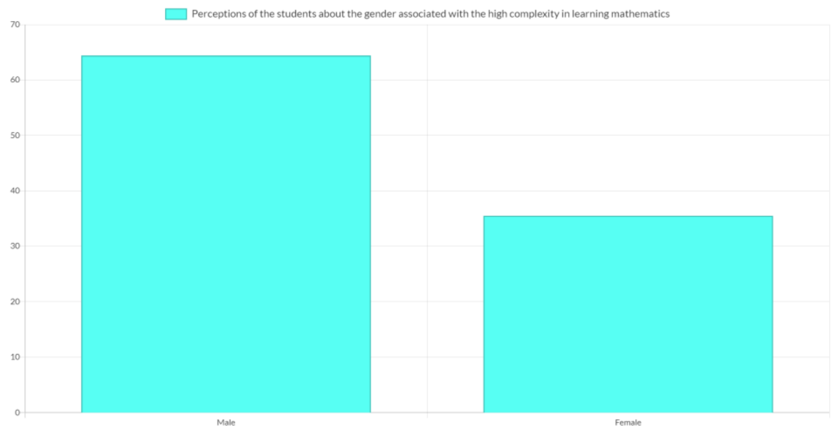

Figure 4: Perceptions of the students about the gender associated with the high complexity in learning mathematics

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Table 4: Perceptions of the students about the motivational beliefs in learning mathematics

Sl. No.	Beliefs	% of response
1	Self-efficacy in practicing mathematics.	57.1
2	Valuing mathematics higher than other subjects.	15.2
3	Interest in learning mathematics.	10.6
4	Seeking mathematical assistance from others.	17.1

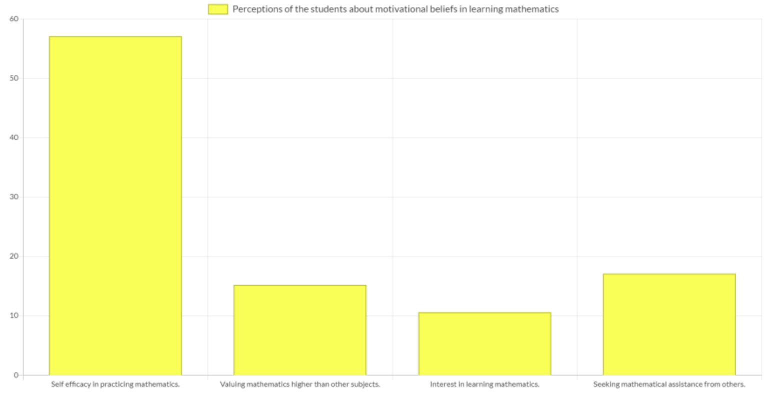

Figure 5: Perceptions of the students about the motivational beliefs in learning mathematics

The findings indicated that girls reported higher levels of mathematics self-efficacy than boys. Lower self-efficacy was associated with greater perceived difficulty in learning and practicing mathematics. Students who perceived mathematics as an easy subject also tended to assign it greater value than other school subjects, whereas lower levels of interest were associated with greater learning difficulties. In addition, students who perceived mathematics as easier were more willing to seek assistance from teachers, peers, or other available sources when they encountered difficulties.

DISCUSSION

The combined responses of students and teachers identified insufficient prior mathematical knowledge as one of the most prominent barriers to mathematics learning. This finding is consistent with previous research showing that students' difficulties cannot be attributed to a single factor but emerge through the interaction of learner characteristics, instructional practices, and the broader learning environment (Abdul Gafoor & Kurukkan, 2015; Saritas & Akdemir, 2009). Mathematics is cumulative: understanding new concepts generally requires mastery of previously acquired knowledge, procedures, and forms of reasoning. Consequently, students who have not developed secure mathematical foundations may struggle to connect new information with earlier learning. Although prior research has also emphasized classroom climate, parental support, assessment practices, peer influence, gender, and socioeconomic status as predictors of mathematics achievement (Kiwanuka et al., 2015), the present findings particularly emphasize the central role of prerequisite knowledge in students' immediate learning experiences.

The teachers' responses further revealed the practical difficulty of addressing students' knowledge gaps within the available instructional time. Teachers reported that introducing new mathematical content was less effective when students lacked the concepts and skills required to understand it. However, the need to progress through the prescribed curriculum may restrict the time available for diagnosis, remediation, and cumulative review. This finding supports the argument that students with mathematics learning difficulties require instructional responses that connect educational research with classroom practice and provide targeted support based on their specific needs (Scherer et al., 2017). The challenge is therefore not simply to slow the pace of instruction, but to determine which prerequisite concepts are essential and provide focused support before students encounter more advanced material.

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The findings also suggest that gaps in prior knowledge may have consequences beyond students' conceptual understanding. Repeated difficulty can weaken students' confidence, reduce their willingness to participate, and reinforce the belief that mathematics is inherently inaccessible. This interpretation is consistent with evidence linking students' beliefs and attitudes toward mathematics with their achievement (Hibi, 2017). The relationship may be reciprocal: limited prior knowledge makes successful performance less likely, while repeated failure may reduce self-efficacy, effort, and engagement. Lower engagement, in turn, provides students with fewer opportunities to consolidate existing knowledge, thereby widening their learning gaps. The present results therefore indicate that cognitive and motivational difficulties should not be treated as separate problems, because each may intensify the other over time.

Rapid forgetting was another major concern reported by the students. More than half of the participants identified forgetting previously learned mathematical material as their principal difficulty, while additional students specifically reported rapidly forgetting formulas. Earlier research has demonstrated that memory in mathematics is closely connected to the quality of mathematical understanding rather than to the mechanical retention of isolated rules and procedures (Byers & Erlwanger, 1985). Research on adults' memories of high-school mathematics has similarly shown the importance of the ways in which mathematical knowledge is originally understood and organized (Karsenty, 2002). The present findings extend this concern to Grade 10 students and suggest that forgetting may begin during the initial stages of learning when new material is encoded without sufficient conceptual depth or connection to existing knowledge.

Students' tendency to forget formulas and procedures may therefore reflect more than an insufficient amount of practice. It may also indicate reliance on surface-level strategies, such as memorizing formulas and reproducing classroom procedures without understanding their mathematical meaning. When knowledge is stored as a collection of disconnected rules, students may recall it in familiar exercises but fail to retrieve or apply it in unfamiliar contexts. By contrast, meaningful mathematics learning involves establishing relationships among concepts, procedures, representations, and applications (Polman et al., 2021). The finding that some students did not know how to study mathematics effectively further supports the need to teach learning strategies explicitly rather than assuming that students will develop them independently.

The study's findings are also compatible with research emphasizing conceptual motivation, active engagement, and meaningful action in mathematics instruction (Abramovich et al., 2019; Hibi, 2026a). Students are more likely to develop durable understanding when they explain their reasoning, connect new concepts with prior knowledge, compare alternative solution methods, and apply mathematical ideas across different contexts. Similarly, research on proportional reasoning has highlighted the relevance of cognitive and metacognitive orientations to students' understanding of important mathematical concepts (Hibi, 2022c). These perspectives suggest that effective instruction should help students become aware of how they approach a task, evaluate whether a strategy is working, and revise their reasoning when necessary.

Taken together, the findings support the use of brief diagnostic assessments before introducing new topics. Such assessments can identify missing prerequisite knowledge and enable teachers to provide targeted review, differentiated instruction, and scaffolded practice. New material should be introduced in manageable stages and explicitly connected to concepts that students have already encountered. Cumulative review, spaced practice, retrieval activities, and varied problem-solving may also help students retain mathematical knowledge and apply it more flexibly. These practices are especially important when instructional time is limited because they allow teachers to focus remediation on the foundational ideas that are most relevant to subsequent learning.

The results additionally highlight the importance of supporting students' self-efficacy while addressing their knowledge gaps. Remedial instruction should not communicate that students are incapable of progressing. Instead, teachers should provide attainable challenges, constructive feedback, and opportunities for successful problem-solving. Students should also be taught how to organize their study time, monitor their understanding,

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practice systematically, and seek assistance when difficulties arise. By combining reinforcement of prerequisite knowledge with explicit instruction in cognitive and metacognitive learning strategies, teachers may help students build more integrated knowledge structures, improve long-term retention, and develop greater confidence in their mathematical abilities.

Overall, the present study reinforces earlier evidence that mathematics learning difficulties arise from an interaction among prior knowledge, instructional conditions, learning strategies, and motivational beliefs. Its distinctive contribution lies in demonstrating that students and teachers largely converge in identifying insufficient foundational knowledge as a central difficulty, while students additionally emphasize rapid forgetting and teachers emphasize inadequate effort and limited instructional time. This convergence suggests that sustainable improvement requires coordinated attention to curriculum pacing, diagnostic teaching, meaningful learning, memory-supporting practices, and students' confidence and engagement.

RECOMMENDATIONS

The findings indicate a need to reconsider existing instructional practices so that mathematics becomes more accessible, meaningful, and engaging for students. Because both teachers and students identified insufficient prior knowledge, limited effort, and difficulties understanding mathematical concepts as major barriers, instructional improvement should address both the cognitive and motivational dimensions of learning. These recommendations are consistent with research emphasizing the importance of considering learners' and teachers' perspectives when developing responses to mathematics learning difficulties (Abdul Gafoor & Kurukkan, 2015).

Mathematics lessons should begin with a brief and purposeful discussion that activates students' prior knowledge, directs their attention toward the central concept of the lesson, and encourages them to express what they already know. Open classroom communication can help teachers identify misunderstandings before they develop into more persistent learning difficulties. Students should feel comfortable asking questions, describing difficulties, and explaining their reasoning without fear of negative judgment. Because mathematical terminology itself can constitute a barrier to learning, teachers should also clarify technical terms, distinguish between everyday and mathematical meanings, and verify that students understand the language used in problem statements and explanations (Hibi, 2026b; Mulwa, 2015).

New mathematical concepts should be introduced through multiple and interconnected representations. These representations may include symbols, verbal explanations, numerical examples, problem situations, diagrams, pictures, tables, graphs, and physical or digital manipulatives. Teachers should not merely present these forms separately; they should explicitly explain how each representation expresses the same underlying mathematical relationship. This approach is consistent with instructional models that organize learning through varied experiences and forms of conceptual engagement (Hibi, 2024d). Moving systematically from concrete and familiar representations toward symbolic and abstract forms may help students construct more coherent mathematical understanding.

Teachers should also demonstrate that mathematical problems can often be solved using more than one method. Comparing different solution strategies can strengthen conceptual understanding, encourage cognitive flexibility, and help students recognize relationships among mathematical procedures. Research on students' work with multiple-solution tasks highlights the value of examining how learners generate, compare, and evaluate alternative approaches (Schindler & Lilienthal, 2020). Nevertheless, instruction should extend beyond teacher demonstrations. Students should regularly solve problems independently, explain their reasoning, justify each step, identify errors, and evaluate alternative methods. Their explanations can provide teachers with evidence of whether they have developed conceptual understanding or are merely reproducing memorized procedures.

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Mathematical ideas should also be connected to meaningful real-life situations. Students may become more interested in mathematics when they understand how it can be used to interpret everyday experiences, solve practical problems, support scientific inquiry, and contribute to technological and professional fields. This recommendation aligns with realistic approaches that encourage learners to view the world through a mathematical perspective (Hibi, 2026c; Arcavi, 2020). However, real-world examples should be mathematically meaningful and clearly connected to the concept being taught, rather than added as superficial illustrations that do not contribute to understanding.

Because mathematical knowledge is cumulative, the introduction of each new topic should be preceded by a focused review of the prerequisite concepts and skills needed to understand it. Brief diagnostic activities can help teachers determine whether students possess the necessary background knowledge and identify specific gaps requiring attention. The support provided should be targeted and responsive to students' actual needs, consistent with recommendations for translating research on mathematics learning difficulties into effective classroom assistance (Scherer et al., 2017). Instruction should then be carefully sequenced from familiar and concrete ideas toward more complex and abstract concepts. Presenting information in manageable stages, using clear examples, and gradually reducing instructional support can minimize unnecessary cognitive demands.

Instruction should prioritize meaningful conceptual understanding alongside procedural fluency. Students are more likely to retain mathematical knowledge when they understand why a procedure works, how it relates to previously learned concepts, and under which conditions it can be applied. Research on meaningful mathematics learning emphasizes the importance of developing connected understanding rather than isolated procedural knowledge (Polman et al., 2021). Teachers should therefore promote deeper learning through activities that require students to explain concepts in their own words, connect related ideas, compare strategies, retrieve previously learned information, and apply knowledge to unfamiliar problems. Concept motivation and active engagement may further help students understand the purpose of the mathematical ideas they are learning (Hibi, 2026c; Abramovich et al., 2019).

Particular attention should be given to strengthening students' mathematics self-efficacy. The present findings showed that lower self-efficacy was associated with greater perceived difficulty, reduced effort, and less independent practice. This pattern is consistent with research linking students' beliefs and attitudes toward mathematics with their achievement (Hibi, 2017). Teachers can strengthen self-efficacy by providing appropriately challenging tasks, dividing complex problems into attainable stages, offering specific and constructive feedback, and acknowledging progress and effective strategy use. Students should be encouraged to interpret mistakes as part of the learning process rather than as evidence of limited mathematical ability. Repeated experiences of successful problem-solving may gradually increase their confidence, persistence, and willingness to attempt more demanding tasks.

Students' interest and engagement may also be strengthened through appropriately designed digital and game-based learning activities. Such activities should not replace conceptual teaching but can provide additional opportunities for practice, immediate feedback, and active participation. Evidence from the *Math-Island* learning environment indicates that carefully designed game-based instruction can enhance both mathematics achievement and students' interest (Hibi, 2026d; Yeh et al., 2019). Teachers should nevertheless ensure that digital activities are aligned with curricular objectives and appropriately balanced in terms of content difficulty, quantity, and diversity.

Finally, students should be actively involved in establishing their own mathematics learning goals and monitoring their progress. These goals should be specific, realistic, measurable, and connected to the intended curriculum. Students should be encouraged to reflect on the effort they invest, the strategies they use, the progress they achieve, and the difficulties that remain. Such reflection can promote greater responsibility for learning and help students identify when they need additional support. The instructional emphasis should

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therefore be placed on sustained effort, effective strategy use, and gradual improvement rather than on the belief that mathematical achievement depends primarily on fixed ability.

Taken together, these recommendations suggest that improving mathematics learning requires more than modifying a single teaching technique. Effective improvement depends on coordinated practices that activate prior knowledge, strengthen mathematical communication, connect multiple representations, promote conceptual understanding, support long-term retention, and enhance students' motivation and self-efficacy. Implementing these practices may help teachers address students' immediate difficulties while also developing the knowledge, strategies, and confidence required for continued mathematics learning.

CONCLUSION

The findings of the present study highlight the central role of effective teaching in making mathematics more accessible to students. Clear explanations, appropriate instructional strategies, meaningful examples, and adequate teacher support may facilitate students' understanding and strengthen their engagement with mathematical content. The findings further suggest that instructional quality and students' interest are closely connected: when teaching practices stimulate curiosity, encourage participation, and clarify the relevance of mathematical concepts, students may be more willing to invest effort in learning.

The results also point to relatively low levels of mathematics self-efficacy among many participating students. Self-efficacy refers to students' beliefs in their capacity to understand mathematical concepts, perform mathematical tasks, and solve problems successfully. Students with low self-efficacy may perceive complex problems as being beyond their abilities, become discouraged when they encounter difficulties, or avoid sustained engagement with challenging tasks. By contrast, students who believe that they can improve through practice and appropriate strategies are more likely to persevere and seek solutions.

Another concern identified in the study was students' limited engagement in independent mathematical practice. Many students appeared to rely primarily on memorizing formulas, repeating classroom procedures, and reproducing teachers' instructions rather than developing conceptual understanding and flexible problem-solving skills. Although procedural practice has an important place in mathematics learning, an excessive reliance on rote memorization may restrict students' ability to retain knowledge, explain their reasoning, or apply familiar procedures to new situations.

From the teachers' perspective, insufficient student effort and low self-efficacy were among the most prominent factors contributing to mathematics learning difficulties. The findings suggest that effort, interest, and self-efficacy may be mutually reinforcing. Students who have little confidence in their mathematical abilities may invest less effort, while limited practice and repeated difficulty may further weaken their confidence and interest. This cycle can contribute to persistent learning gaps and lower achievement.

Accordingly, interventions designed to improve mathematics achievement should address both cognitive and motivational dimensions of learning. Teachers should provide students with opportunities for guided and independent practice, appropriately challenging tasks, constructive feedback, and repeated experiences of successful problem-solving. Instruction should also encourage students to explain their reasoning, learn from errors, monitor their progress, and recognize that mathematical competence can develop through sustained effort and effective strategies. Strengthening students' interest and self-efficacy, while simultaneously improving instructional quality, may contribute to greater engagement, persistence, and achievement in mathematics.

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