How The Mathematics Learning Involvement of Students in Village

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Abstract. This qualitative study explores the mathematics learning involvement of students in rural areas, with a specific focus on villages in the Kepulauan Meranti Regency, Riau Province. The participants in this research were mathematics teachers who provided insights into students' learning behaviors and challenges. Data were collected through in-depth interviews and analyzed using Creswell's (2014) qualitative data analysis techniques. The findings reveal that students in these rural settings face significant difficulties in understanding mathematical concepts. Furthermore, their interest and motivation to learn mathematics are notably low, resulting in minimal engagement during mathematics instruction. These conditions suggest a critical need for contextual and innovative teaching approaches to enhance students' learning involvement and overall mathematical understanding in village schools

Keywords: *Mathematics learning, student involvement, rural education, qualitative research, Riau*

1. INTRODUCTION

Mathematics is universally recognized as a critical subject in formal education (1,2). It plays a vital role not only in academic achievement but also in developing logical reasoning, problem-solving abilities, and decision-making skills essential for daily life. However, the quality and effectiveness of mathematics education vary significantly depending on various contextual factors, particularly between urban and rural settings (3,4). Students in rural or remote areas often face a distinct set of challenges that affect their learning involvement, engagement, and academic outcomes in mathematics.

In Indonesia, especially in areas like the Kepulauan Meranti Regency in Riau Province, educational challenges in rural regions are exacerbated by geographical isolation, limited access to qualified teachers, lack of teaching resources, and socio-economic constraints (5,6). These factors collectively contribute to the low performance and participation of students in subjects such as mathematics. Although national education policies emphasize equal access and quality of education, the reality in rural settings is far from ideal (7–10). Student involvement in mathematics learning is a crucial indicator of academic success. Involvement includes cognitive engagement (mental effort and investment), behavioral engagement (participation in class activities), and emotional engagement (interest and motivation) (11,12). When students are actively involved, they tend to demonstrate a higher level of comprehension, persistence in solving problems, and a positive attitude toward learning. Conversely, low involvement often correlates with poor understanding, low academic performance, and even aversion to the subject.

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Several international studies highlight the importance of student engagement in mathematics. Student engagement is a multidimensional construct that significantly influences learning outcomes. Similarly, Skinner and Belmont (1993) found that students who perceive their classroom environment as supportive and stimulating are more likely to engage positively in learning activities (13–16). However, research also suggests that students in disadvantaged or under-resourced settings often exhibit low levels of engagement due to extrinsic barriers such as lack of instructional materials, unqualified teachers, or uninspiring pedagogical methods In the context of mathematics education, rural students often struggle with abstract concepts that are not easily connected to their lived experiences . When learning is not contextualized, students fail to see the relevance of mathematics in their everyday lives, further reducing their motivation and effort (17–20). This issue is amplified in rural areas where the curriculum and teaching strategies often do not account for local culture, context, or the specific needs of village students. As a result, mathematics becomes a source of anxiety and disengagement rather than curiosity and growth.

Teachers play a pivotal role in shaping student engagement in mathematics. Their instructional strategies, ability to build rapport, and efforts to make mathematics meaningful can significantly impact students' attitudes and involvement (21–24) . However, in many rural schools, teachers are frequently overburdened, undertrained, and lack access to professional development opportunities. This situation hampers their capacity to implement innovative and student-centered teaching approaches, which are essential for fostering involvement in learning . In Indonesia's rural contexts, previous studies have found that students often rely heavily on rote memorization, with little emphasis on problem-solving or conceptual understanding. Such practices contribute to superficial learning and a lack of critical thinking skills (25–27). Additionally, students in rural schools frequently express that mathematics is a difficult and irrelevant subject, which negatively impacts their motivation and willingness to participate.

The Kepulauan Meranti Regency, located in the eastern part of Riau Province, consists of islands with limited educational infrastructure. Schools in this region often face difficulties in recruiting and retaining qualified mathematics teachers. Students frequently lack access to textbooks, technology, and extracurricular support. These conditions contribute to a learning environment that is not conducive to sustained engagement in mathematics. Given this context, this study seeks to explore how students in rural villages of Kepulauan Meranti engage in mathematics learning, and what factors influence their involvement. Using a qualitative approach, the research focuses on the perspectives of teachers who interact directly with students and observe their behaviors, attitudes, and challenges in the learning process. In-depth interviews allow for a deeper understanding of the contextual realities that shape students' experiences with mathematics education.

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This study employs Creswell's (2014) framework for qualitative data analysis to systematically identify emerging themes related to student involvement. Through coding and thematic analysis, the research identifies patterns that reveal students' difficulties in understanding mathematical content, lack of motivation, and minimal participation in classroom activities. These findings are not only crucial for understanding the current state of mathematics education in rural areas but also serve as a foundation for designing contextually relevant interventions. Understanding the involvement of rural students in mathematics learning is essential for multiple stakeholders, including policymakers, educators, and curriculum developers. It highlights the urgent need for targeted policies that address inequities in education, especially in marginalized regions. Improving mathematics involvement requires a multifaceted approach, including teacher training, curriculum adaptation, incorporation of local context, and resource allocation tailored to rural needs.

Moreover, this study contributes to the broader discourse on educational equity and quality in developing countries. While urban schools often benefit from technological advancements and pedagogical innovations, rural schools remain left behind. Bridging this gap necessitates a deeper understanding of the lived realities of rural students, particularly their cognitive, emotional, and behavioral engagement in subjects like mathematics. In summary, mathematics learning involvement among students in rural villages is a critical yet under-researched issue. In regions such as Kepulauan Meranti, where educational disadvantages persist, it becomes imperative to investigate how students experience mathematics education. By focusing on teacher perspectives and qualitative data, this study offers valuable insights into the barriers to engagement and points toward possible strategies for enhancing mathematics learning in rural Indonesian contexts.

2. RESEARCH METHOD

This study employed a qualitative research design to explore the involvement of village students in learning mathematics, with a particular focus on the experiences and perceptions of teachers in the rural district of Kepulauan Meranti, Riau Province, Indonesia. The decision to use a qualitative approach was based on the nature of the research problem, which required in-depth understanding of social phenomena—namely, the attitudes, behaviors, and challenges that characterize students' engagement in mathematics learning in a rural context. Qualitative research is well-suited for studies that aim to capture complex, context-bound realities and the meanings individuals assign to their experiences. According to Creswell (2014), qualitative research allows for a rich and detailed description of phenomena, providing insights that are not easily obtainable through quantitative methods. By adopting a qualitative methodology, this study seeks to reveal not only observable behaviors but also the underlying factors—such as motivation, perception, and social context—that influence student engagement in mathematics.

The research followed a basic qualitative descriptive design, aiming to describe and interpret the phenomenon of low student involvement in mathematics learning through the lens of

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experienced teachers. This approach is suitable when the goal is to explore real-life situations and gain insight into participants' perspectives without manipulating the environment or variables. The study was conducted in several rural schools in the Kepulauan Meranti district. This area was chosen because of its geographic isolation, limited educational resources, and consistently low student performance in mathematics as reported by local educational authorities. These characteristics made it an appropriate site to investigate the research question. The participants in this study were selected using purposive sampling, a technique commonly used in qualitative research to select information-rich cases relevant to the research objectives. The main inclusion criteria were: The participant must be a mathematics teacher currently teaching in a village school in the Kepulauan Meranti district. The teacher must have at least three years of experience in teaching mathematics in rural schools. The teacher must be willing to participate in a detailed interview and share their experiences honestly. A total of eight teachers (five female, three male), from six different village-based junior high schools in Kepulauan Meranti, were selected for participation. The diversity in teaching experience (ranging from 3 to 15 years) allowed the researcher to collect varied perspectives on student engagement and challenges in learning mathematics.The primary method of data collection was in-depth semi-structured interviews. This technique was chosen because it allows participants to express their views freely while also enabling the researcher to probe deeper into specific themes. The interviews were guided by a flexible interview protocol designed to explore the following areas: Teachers' observations of students' participation in mathematics classes, Perceived levels of student motivation and interest in learning mathematics, Common difficulties students face when learning mathematical concepts, Teachers' strategies to improve student involvement and their perceived effectiveness, Contextual factors (social, economic, and infrastructural) affecting learning, Each interview lasted between 45 and 60 minutes and was conducted face-to-face at the teachers' respective schools. With participants' consent, the interviews were audio-recorded for accuracy and later transcribed verbatim for analysis. To ensure credibility, the researcher employed techniques such as prolonged engagement at the research site and member checking, whereby participants reviewed a summary of their interview responses for accuracy and clarification. Thematic analysis was used to analyze the qualitative data, following the six-step model proposed by Creswell (2014): Organizing and preparing the data for analysis – This involved transcribing interviews, sorting field notes, and reviewing all materials collected. Reading through all the data – The researcher repeatedly read the transcripts to gain a general sense of the information and to reflect on its overall meaning. Coding the data – The researcher identified key phrases, statements, and patterns across the interviews and assigned descriptive codes to segments of data. Generating themes and sub-themes – Codes were grouped into categories and overarching themes that captured the essence of participants' experiences. Interpreting and making meaning of the data – The researcher reflected on how the themes related to each other and to the broader research questions.

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Validating the findings – To increase reliability, peer debriefing was conducted with another qualitative researcher to examine the coding process and resulting themes. The primary themes that emerged from the analysis included: (1) students' lack of understanding of mathematical concepts, (2) low intrinsic and extrinsic motivation, (3) socio-economic barriers to learning, (4) limited access to educational resources, and (5) ineffective teaching methods. This study adhered to strict ethical standards to protect the rights and welfare of all participants. Before data collection, informed consent was obtained from each participant after providing them with detailed information about the purpose, procedures, and voluntary nature of the study. Participants were assured that their responses would remain confidential and anonymous, and that they could withdraw at any time without consequence. To protect identities, pseudonyms were used in all documentation and reports. Data were stored securely, and only the researcher had access to raw data. Ethical approval for the study was obtained from the relevant institutional research ethics board. To ensure the trustworthiness of the research findings, the study employed multiple strategies commonly used in qualitative research, including: Achieved through triangulation (using multiple participants), member checking, and prolonged engagement in the field. While the study is context-specific, rich descriptions of the research setting, participants, and findings have been provided to allow readers to determine applicability in other contexts. The research process was documented thoroughly, including the rationale for methodological decisions, to ensure replicability. The researcher maintained a reflective journal to document personal assumptions and ensure that findings emerged from the data rather than personal biases.

3. RESULTS AND DISCUSSION

3.1 Results

This section presents the results of the qualitative analysis conducted on the interview data collected from eight mathematics teachers in rural junior high schools in Kepulauan Meranti, Riau. The aim was to explore students' involvement in mathematics learning and to identify the key factors that influence their engagement. Through thematic analysis, five major themes emerged: (1) limited understanding of mathematical concepts, (2) low student motivation, (3) socio-economic barriers, (4) inadequate learning resources and infrastructure, and (5) instructional challenges. These themes are discussed below along with relevant literature to contextualize the findings.

Limited Understanding of Mathematical Concepts

All participants reported that a significant proportion of their students struggle to understand basic and intermediate mathematical concepts. Teachers consistently observed that students were unable to grasp foundational ideas such as fractions, equations, and problem-solving techniques, even after repeated instruction.

One teacher noted: "Many students just memorize formulas without knowing when or how to use them. They cannot explain why a formula works or apply it in a new situation."

This difficulty in conceptual understanding appears to stem not only from individual cognitive challenges but also from the students' learning environments, which often lack support for abstract reasoning or exploratory learning. The findings align with research by Kilpatrick et al. (2001), who emphasize that deep mathematical understanding requires more than procedural knowledge—it demands conceptual insight and problem-solving strategies. In rural areas, this kind of understanding is often not fostered due to a lack of support and pedagogical innovation.

Low Student Motivation

A recurring theme across all interviews was students' low motivation to engage in mathematics learning. Teachers described students as frequently disinterested, easily distracted, and reluctant to participate in class activities. As one participant described: "They see math as a scary subject. Even before the lesson begins, they already feel defeated."

Low motivation appeared to have both intrinsic and extrinsic causes. Internally, students lacked confidence and interest; externally, they did not perceive mathematics as relevant to their future or daily lives. This perception is consistent with Deci and Ryan's (1985) self-determination theory, which suggests that motivation is diminished when individuals feel incompetent, lack autonomy, or find no value in the task at hand.

Teachers also mentioned that positive reinforcement from families or communities regarding the importance of mathematics was generally absent. In contrast, subjects perceived as more practical or easier—such as social studies or vocational topics—were more likely to garner students' attention.

Socio-Economic Barriers

The socio-economic background of students was cited as a major influence on learning involvement. Many students came from families with limited educational backgrounds and were often expected to help with household chores or agricultural work, especially during school breaks or harvest seasons.

A teacher remarked:

"Some of them have to work after school to support their families. By the time they come to class the next day, they are tired and cannot concentrate."

These circumstances reduce the time and energy students can devote to academic tasks, which in turn affects their academic progress. Research by Sirin (2005) supports this view, showing that socio-economic status significantly correlates with educational outcomes, particularly in core subjects like mathematics.

Furthermore, the digital divide exacerbated the situation. Most students in these villages lacked access to internet connectivity or digital learning tools, making it difficult to engage in supplementary learning or to catch up when lessons were missed.

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Inadequate Learning Resources and Infrastructure

All participants pointed out the severe lack of adequate learning materials and infrastructure in their schools. In many classrooms, mathematics was still taught using outdated textbooks and limited instructional aids. Visual tools, manipulatives, or digital resources were rarely available, and blackboards remained the primary teaching medium.

One teacher explained:

"We don't have projectors, calculators, or any kind of multimedia support. Teaching abstract topics like geometry or algebra becomes extremely difficult."

This scarcity of resources not only affects how lessons are delivered but also how students perceive the learning process. Without interactive or engaging materials, students quickly lose interest. According to the findings of Tienken and Zhao (2013), access to quality learning materials and technologies significantly enhances student motivation and comprehension, especially in STEM education.

Additionally, classroom conditions—such as poor lighting, uncomfortable seating, and high student-to-teacher ratios—further limited effective engagement in mathematics learning.

Instructional Challenges and Teaching Practices

The final theme relates to instructional approaches and the professional challenges faced by the teachers themselves. Several participants admitted to using traditional, teacher-centered methods because they lacked training in innovative pedagogical strategies or problem-based learning models.

One teacher confessed:

"We usually just explain the topic, give examples, and assign exercises. But we know this doesn't always help students understand."

Many teachers expressed a desire to improve their teaching methods but were constrained by limited access to professional development programs. The absence of regular teacher training in rural areas has long been a barrier to educational progress. As Darling-Hammond (2010) notes, continuous teacher development is crucial to improving student learning outcomes, especially in challenging educational contexts.

Despite these limitations, some teachers attempted to incorporate real-life examples, group discussions, or storytelling to make lessons more relatable, though their effectiveness was inconsistent due to time constraints and varied student readiness.

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3.2. Discussion

The findings of this study reveal a complex interplay of cognitive, motivational, socio-economic, and institutional factors that influence students' involvement in mathematics learning in rural village settings. These findings corroborate previous research highlighting that student engagement is not merely a matter of individual willpower or academic ability, but rather the product of multiple interrelated conditions (Fredricks, Blumenfeld, & Paris, 2004).

Low involvement in mathematics learning in these contexts cannot be effectively addressed without systemic interventions. Efforts to enhance student engagement must include:

- Professional development for teachers focused on culturally relevant and context-sensitive pedagogies;
- Provision of modern learning resources and infrastructure;
- Community-based programs to raise awareness of the value of mathematics education;
- Policy initiatives that bridge the urban-rural education gap and ensure equity in resource allocation.

Most importantly, there is a need to develop mathematics curricula and instructional strategies that reflect the realities and needs of rural students. Contextualized learning—where mathematical concepts are linked to students' daily experiences—can foster deeper understanding and motivation. For instance, using examples from agriculture, trade, or local traditions may help students see the relevance of mathematics in their lives, thereby enhancing their involvement.

4. CONCLUSION

This study aimed to explore the extent of students' involvement in mathematics learning in rural areas, specifically among junior high school students in the villages of Kepulauan Meranti, Riau Province, Indonesia. Through in-depth interviews with eight mathematics teachers working in village schools, the research uncovered a range of factors contributing to the low levels of student engagement in mathematics. The findings provided valuable insights into the cognitive, emotional, environmental, and institutional dimensions of learning involvement in underserved educational contexts.

A major conclusion drawn from the study is that students in these rural areas face substantial difficulties in understanding mathematical concepts. Their limited comprehension is largely rooted in foundational gaps, lack of learning support at home, and instructional approaches that are often not tailored to their needs. The abstract and symbolic nature of mathematics becomes even more daunting when it is not contextualized or linked to the students' everyday experiences.

Additionally, the study found that student motivation to learn mathematics is strikingly low. Many students develop negative attitudes toward the subject early in their academic journey, perceiving it as too difficult, irrelevant, or anxiety-inducing. This perception is reinforced by a lack of encouragement from family and community members, many of whom do not recognize the value of mathematics for future careers or problem-solving in daily life.

Socio-economic conditions also emerged as significant barriers to active learning. Students from low-income families often prioritize household responsibilities over academic tasks. In some cases, children are required to help support their families financially, reducing their available time and energy for schoolwork. Moreover, the digital divide further limits access to alternative learning platforms, tutoring, or educational media that could supplement classroom instruction.

Inadequate learning infrastructure and the lack of up-to-date instructional materials also play a crucial role in hindering mathematics learning. Most classrooms in the observed rural schools were poorly equipped, and teachers had minimal access to teaching aids such as visual models, manipulatives, or multimedia tools. This made it particularly difficult to explain abstract mathematical concepts in a concrete, engaging manner.

Finally, instructional challenges faced by the teachers themselves contribute to the issue. Most educators relied on traditional, lecture-based teaching methods, largely due to limited access to professional development programs and resources. Without training in innovative or student-centered pedagogies, many teachers find it difficult to inspire student interest and involvement in the learning process.

In summary, the mathematics learning involvement of students in these village schools is constrained by a complex interplay of internal and external factors, including cognitive difficulties, low motivation, socio-economic hardship, poor infrastructure, and limited pedagogical innovation. Unless these issues are addressed through systemic, contextual, and collaborative efforts, rural students will continue to face academic disparities that hinder their long-term educational and professional opportunities.

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