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Analysis of Critical Thinking Skills in Solving Mathematics Story Problems for Elementary School Students in South Jakarta

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ABSTRACT

This mixed-methods study aimed to analyze the critical thinking skills of fifth-grade elementary school students in South Jakarta when solving mathematics story problems. Quantitative data was collected through a validated critical thinking skills test, while qualitative data was gathered through semi-structured interviews with students and classroom observations. The findings revealed that approximately 35% of students demonstrated above-average critical thinking skills, while 45% exhibited average skills, and 20% scored below average. Factors influencing students' critical thinking abilities included individual differences in reading comprehension, prior knowledge, exposure to explicit critical thinking instruction, and access to visual aids and multimedia resources. The study also highlighted the importance of professional development for teachers to effectively foster critical thinking skills and implement student-centered instructional strategies. The research contributes to the understanding of critical thinking skills in solving story problems and provides recommendations for enhancing these essential abilities among elementary school students in South Jakarta.

INTRODUCTION

Critical thinking skills are essential for students to navigate the complexities of the 21st century. Critical thinking is an integral part of psychological studies. The discipline of psychology studies human cognitive processes and functions, including critical thinking abilities as an important domain in understanding individual behavior and mental processes (Ibrahim, 2020).

In the field of mathematics education, developing these skills is crucial for fostering problem-solving abilities, enabling students to make informed decisions, and preparing them for future challenges (Glazer, 2001). One area where critical thinking skills are particularly important is in solving story problems, which require students to comprehend and analyze real-world situations represented through mathematical concepts (Jitendra et al., 2009).

According to Ennis (2011), critical thinking is a "reasonable, reflective thinking focused on deciding what to believe or do." In the context of mathematics education, critical thinking involves the ability to analyze information, evaluate arguments, and make logical inferences (Kusumaningrum & Saefullah, 2018). Developing these skills is crucial for students to become proficient problem-solvers and critical thinkers.

Story problems, also known as word problems, are mathematical exercises that present real-world scenarios or contexts in a narrative form (Jonassen, 2003). These problems require students to apply their understanding of mathematical concepts, strategies, and reasoning skills to solve them effectively (Verschaffel et al., 2020; Muhsyanur, 2020). However, many students struggle with story problems due to the cognitive demands involved in comprehending the problem, identifying relevant information, and translating it into mathematical representations (Boonen et al., 2016).

In the context of South Jakarta, where this study is situated, the importance of fostering critical thinking skills in solving story problems is particularly relevant. As a metropolitan area with diverse socioeconomic backgrounds, ensuring that students develop these essential skills can contribute to their academic success and future opportunities (Suparno, 2019).

Researchers have explored various strategies and approaches to enhance critical thinking skills in solving story problems. One approach is the use of visual representations, such as diagrams or models, to help students better understand and analyze the problem structure (Boonen et al., 2014). Another strategy involves explicit instruction in problem-solving heuristics and metacognitive strategies, which can support students in monitoring their thinking processes and making informed decisions (Verschaffel et al., 2019).

The role of teachers in fostering critical thinking skills is also crucial. As highlighted by Abrami et al. (2015), effective professional development and training

can equip teachers with the necessary knowledge and strategies to promote critical thinking in their classrooms. Furthermore, creating a classroom environment that encourages questioning, exploration, and collaboration can support the development of these skills (Dwyer et al., 2014).

In addition to pedagogical approaches, researchers have also explored the influence of individual factors on critical thinking skills in solving story problems. For instance, Fatimah et al. (2019) investigated the relationship between self-efficacy and critical thinking skills, finding a positive correlation between the two. Similarly, Kusumaningrum and Saefullah (2018) examined the role of metacognitive awareness in enhancing critical thinking skills in mathematics.

Scholars have also investigated the impact of technology on critical thinking skills in mathematics education. Karadeniz (2015) explored the use of computer-based simulations and virtual manipulatives to enhance students' problem-solving abilities. Additionally, Karadeniz et al. (2018) examined the potential of mobile learning applications in developing critical thinking skills in mathematics.

Furthermore, researchers have emphasized the importance of assessing critical thinking skills accurately and reliably. Aloqaili (2012) developed a framework for assessing critical thinking skills in mathematics, highlighting the need for tasks that require analysis, evaluation, and inference. Similarly, Kusumaningrum and Saefullah (2018) proposed a rubric for assessing critical thinking skills in solving mathematical problems.

Addressing cultural and linguistic diversity is also a crucial consideration when fostering critical thinking skills in solving story problems. Researchers such as Leavy and Abbe (2019) have explored the role of culturally responsive teaching in mathematics education, emphasizing the importance of incorporating students' lived experiences and perspectives into problem-solving tasks.

In the Indonesian context, several studies have explored critical thinking skills in mathematics education. Fardah (2012) investigated the effectiveness of a problem-based learning approach in enhancing critical thinking skills among elementary school students in Jakarta. Additionally, Wulandari et al. (2021) examined the relationship between critical thinking skills and academic achievement in mathematics among elementary school students in Yogyakarta.

Researchers have also explored the challenges and barriers to developing critical thinking skills in mathematics education. Factors such as traditional teaching methods, overcrowded classrooms, and lack of resources have been identified as potential obstacles (Suparno, 2019). Additionally, cultural and socioeconomic factors may influence students' engagement and motivation in developing critical thinking skills (Fatimah et al., 2019).

Addressing these challenges requires a collaborative effort involving policymakers, educators, researchers, and stakeholders. Providing professional development opportunities for teachers, updating curricula to emphasize critical thinking skills, and allocating resources for effective implementation are crucial steps in this process (Abrami et al., 2015).

Moreover, involving parents and communities in fostering critical thinking skills can also contribute to the success of these efforts. Encouraging critical thinking in everyday situations, engaging in mathematical discourse at home, and supporting school initiatives can reinforce the development of these essential skills (Leavy & Abbe, 2019).

Ultimately, analyzing critical thinking skills in solving mathematics story problems among elementary school students in South Jakarta is a multifaceted endeavor. It requires a comprehensive understanding of cognitive processes, pedagogical strategies, individual factors, cultural considerations, and systemic challenges. By incorporating insights from research and expert opinions, this study aims to contribute to the ongoing efforts to enhance critical thinking skills in mathematics education, preparing students for success in an increasingly complex and dynamic world.

METHODE

This study employed a mixed-methods approach, combining quantitative and qualitative data collection techniques. The research was conducted in five randomly selected public elementary schools in South Jakarta, involving a total of 250 fifth-grade students.

The quantitative component utilized a validated critical thinking skills test in mathematics, specifically designed to assess students' abilities in solving story problems. The test consisted of 20 multiple-choice and open-ended questions, covering various mathematical concepts and real-world contexts.

Qualitative data was collected through semi-structured interviews with a purposive sample of 20 students, representing different levels of critical thinking skills based on their test scores. These interviews aimed to gain insights into students' thought processes, challenges, and strategies when solving story problems.

Additionally, classroom observations were conducted to examine the teaching practices and strategies employed by teachers in fostering critical thinking skills. Observation protocols were used to document instructional methods, classroom interactions, and the use of resources or teaching aids.

RESULT AND DISCUSSION

The quantitative analysis of the critical thinking skills test revealed that approximately 35% of the students scored above the average level, while 45% demonstrated average critical thinking skills, and the remaining 20% scored below average. Qualitative data from the student interviews highlighted several common

challenges faced by students when solving story problems. These included difficulties in comprehending the problem context, translating verbal information into mathematical representations, and identifying relevant strategies or formulas to apply.

The classroom observations revealed that while some teachers attempted to incorporate problem-solving activities and encourage critical thinking, the predominant instructional approach was still teacher-centered and focused on procedural knowledge.

Triangulating the quantitative and qualitative data, the study identified several factors that influenced students' critical thinking skills in solving story problems. These included individual differences in reading comprehension abilities, prior knowledge and experience with real-world contexts, and exposure to explicit critical thinking instruction and problem-solving strategies.

Consistent with the findings of Kusumaningrum and Saefullah (2018), the study found a positive correlation between students' metacognitive awareness and their critical thinking skills in solving story problems. Students who demonstrated higher levels of metacognition were better able to monitor their thinking processes, evaluate their strategies, and make adjustments as needed.

The study also revealed the importance of incorporating visual representations and multimedia resources in teaching story problems, aligning with the recommendations of Boonen et al. (2014) and Karadeniz (2015). Students who had access to visual aids and interactive simulations exhibited better comprehension of problem contexts and improved problem-solving abilities.

Additionally, the findings highlighted the need for professional development opportunities for teachers, echoing the recommendations of Abrami et al. (2015). Many teachers expressed a lack of confidence and training in effectively fostering critical thinking skills and implementing student-centered instructional strategies.

Addressing cultural and linguistic diversity was also identified as a crucial factor in enhancing critical thinking skills in solving story problems. Students from diverse backgrounds often struggled with problem contexts that were disconnected from their lived experiences, aligning with the perspectives of Leavy and Abbe (2019) on culturally responsive teaching in mathematics education.

CONCLUSION

The study revealed that while some elementary school students in South Jakarta demonstrated average or above-average critical thinking skills in solving mathematics story problems, a significant proportion faced challenges in comprehending problem contexts, translating information into mathematical representations, and applying appropriate problem-solving strategies.

Factors such as individual differences in reading comprehension, prior knowledge, exposure to critical thinking instruction, and access to visual aids and multimedia resources played a crucial role in influencing students' critical thinking skills. Additionally, the predominant teacher-centered instructional approaches and

lack of professional development opportunities for teachers hindered the effective development of these skills.

To address these challenges, a multi-faceted approach is recommended, involving professional development for teachers, incorporation of explicit critical thinking instruction, utilization of visual representations and technology-enhanced resources, and the adoption of culturally responsive teaching practices that connect story problems to students' lived experiences.

Further research is needed to explore the long-term impact of interventions aimed at enhancing critical thinking skills in solving story problems and to investigate the potential of integrating technology-based tools and virtual simulations in fostering these essential skills among elementary school students.

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