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EFFORTS TO DEVELOP INTEREST IN LEARNING MATHEMATICS USING THE DISCOVERY LEARNING MODEL FOR STUDENTS OF GRADE IV AT SD KARTIKA I-1 MEDAN

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Abstract

This classroom action research aims to explore efforts to enhance students' interest in learning mathematics through the application of the Discovery Learning model in a fourth-grade class at SD Kartika I-1 Medan. The study was motivated by the low interest and achievement in mathematics among students, as evidenced by pre-test results where most students scored below the minimum competency standards. Using the Kemmis & McTaggart model, the research was conducted over two cycles consisting of planning, action, observation, and reflection. The implementation involved engaging students actively in the learning process through the six phases of Discovery Learning: stimulation, problem statement, data collection, data processing, verification, and generalization. Data were collected using tests, observations, and documentation. The findings indicate a significant increase in student engagement and mathematical achievement. The average score rose from 39.26 in the pre-test to 83.38 in the post-test, and the percentage of students reaching the "developing" and "very developing" categories improved notably. The study concludes that the Discovery Learning model is effective in fostering student motivation, confidence, and interest in mathematics at the elementary level.

Keywords

discovery learning, mathematics interest, classroom action research

Introduction

Education is a fundamental instrument for shaping a nation's future, and its quality is often measured by the strength of its primary education system. In the context of Indonesia, elementary education represents a critical phase where students begin to form essential cognitive frameworks and attitudes toward learning. Among the core subjects taught at this level, mathematics stands as a crucial discipline due to its role in developing logical reasoning,

analytical thinking, and problem-solving skills. According to the Indonesian Law No. 20 of 2003 concerning the National Education System, mathematics is a compulsory component of the school curriculum, expected to prepare students not only for academic success but also for real-life applications such as financial literacy, scientific understanding, and technological interaction. However, despite its significance, many elementary students perceive mathematics as an abstract, difficult, and even frightening subject. This perception is often the result of rigid and teacher-centered pedagogical practices that fail to make learning engaging or meaningful for young learners.

The gap between the intended learning outcomes and students' actual experiences is evident in the case of SD Kartika I-1 Medan. Based on preliminary data collected through pre-tests, a significant portion of fourth-grade students demonstrated low levels of interest and achievement in mathematics, with over 73% of them categorized as "less developed" or "in need of improvement," and none achieving scores in the "very developed" range. These findings suggest that conventional instructional models, primarily centered on lecture-based delivery, are insufficient in fostering motivation or deep understanding. Moreover, psychological barriers such as fear, anxiety, and low self-confidence further hinder students' ability to engage with mathematical concepts. It is crucial, therefore, to adopt a more student-centered and exploratory teaching approach that aligns with the constructivist view of learning—where students actively build their own understanding through hands-on experience, inquiry, and critical reflection.

In response to this pedagogical challenge, the present study explores the use of the Discovery Learning model as an alternative instructional strategy aimed at increasing students' interest in mathematics. Rooted in the constructivist learning theory, Discovery Learning encourages learners to engage with content actively by investigating problems, forming hypotheses, and drawing conclusions through guided exploration. As outlined by Iwantoro et al. (2022), the model emphasizes six critical stages—stimulation, problem statement, data collection, data processing, verification, and generalization—each designed to facilitate deep learning and active student participation. Prior studies such as those by Oktaviani et al. (2018), Maisari and Usman (2024), and Widyaningrum and Suparni (2023) have shown that the Discovery Learning model can significantly enhance both interest and academic performance in mathematics. These studies provide compelling evidence that when students are given the opportunity to discover concepts independently, they develop not only a better conceptual understanding but also a greater sense of ownership over their learning process.

This research is particularly novel and significant because it applies the Discovery

Learning model within a classroom action research (CAR) framework, allowing for iterative evaluation and refinement of instructional practices in real time. Using the Kemmis and McTaggart model, this study involves a cyclical process of planning, action, observation, and reflection, which enables the researcher to assess the impact of Discovery Learning on student interest over two cycles of implementation. The context-specific nature of this study—conducted within an Indonesian primary school—adds valuable insights into how global pedagogical innovations can be effectively adapted to local classroom realities. Ultimately, the research not only aims to improve learning outcomes in a specific school but also aspires to offer a replicable and evidence-based instructional model for other educators facing similar challenges. Through this study, it is hoped that mathematics instruction at the elementary level can become more engaging, student-driven, and effective in cultivating lifelong learning skills.

Methods

This study employed a classroom action research (CAR) design grounded in the Kemmis and McTaggart model, which emphasizes a cyclical and reflective approach to improving educational practices. The research was conducted in SD Kartika I-1 Medan, specifically in a fourth-grade classroom during the second semester of the 2024/2025 academic year. The choice of this school was based on its willingness to cooperate and the absence of prior studies addressing the same problem within the institution. The participants consisted of 34 students, who served as the primary subjects, while the fourth-grade homeroom teacher was involved as a collaborative partner in the implementation and observation process. The main objective of the study was to examine the effectiveness of the Discovery Learning model in enhancing students' interest in mathematics, particularly on the topic of geometric figures.

The methodological framework was organized into two action cycles, each comprising four key stages: planning, action, observation, and reflection. In the planning stage, the researcher collaborated with the class teacher to design the learning plan, which included formulating lesson plans (RPP), preparing student worksheets (LKPD), designing media and learning materials, and constructing assessment instruments. The research adopted a one-group pretest-posttest design to measure the impact of the intervention. Before the intervention, a pretest was administered to assess the students' baseline understanding and interest in mathematics.

In the action stage, the Discovery Learning model was implemented in accordance with its six procedural phases: stimulation, problem statement, data collection, data processing,

verification, and generalization. During classroom instruction, students were encouraged to actively explore mathematical problems, formulate their own hypotheses, and collaboratively seek solutions. The teacher acted as a facilitator, providing scaffolding only when necessary to support student-led inquiry. This hands-on and explorative approach marked a departure from the conventional lecture-based methods commonly used in the classroom.

The observation stage involved the systematic collection of qualitative and quantitative data to evaluate student engagement, participation, and academic improvement. Observational checklists were used to record student and teacher activities, while documentation such as photographs and field notes provided contextual insights. Quantitative data were obtained from learning achievement tests administered at the end of each cycle. Both sets of data served to triangulate findings and ensure reliability.

Finally, the reflection stage was carried out collaboratively between the researcher and the classroom teacher to assess the effectiveness of the implemented strategies. Based on the results of the first cycle, modifications were made to improve instructional delivery in the second cycle. The reflective process also informed decisions about whether to continue the intervention or conclude the research. The study was deemed successful when at least 75% of students reached the "developing" or "very developing" categories as defined by the KKTP (Kriteria Ketercapaian Tujuan Pembelajaran) rubric.

Data analysis was performed using both descriptive statistics and qualitative interpretation. The mean score, standard deviation, and classical completeness percentage were calculated to determine academic improvement from pretest to posttest. Qualitative data from observations were coded thematically to highlight behavioral changes and engagement levels. The study's rigor was enhanced through careful validation of instruments, including expert reviews of test items and observational rubrics to ensure content validity. Through this methodical and reflective approach, the research aimed not only to investigate the impact of the Discovery Learning model on student interest but also to provide a replicable model of instructional improvement for primary mathematics education in Indonesia.

Discussion

The results of this study demonstrate a significant improvement in students' interest and achievement in mathematics following the implementation of the Discovery Learning model. Prior to the intervention, the majority of Grade IV students at SD Kartika I-1 Medan showed

limited enthusiasm toward mathematics learning. This was clearly evident in the pre-test results, where the average score stood at 39.26, with no students achieving the highest category of learning mastery, and more than 70% categorized as "less developed" or "in need of improvement." Such a low performance baseline underscores a critical disconnect between conventional teaching methods—primarily lecture-based instruction—and the actual learning needs of young students, especially in abstract subjects like mathematics. The observation confirmed that students were disengaged during lessons, hesitant to ask questions, and lacked motivation to participate in class discussions. These initial findings corroborate previous research (Widyaningrum & Suparni, 2023; Oktaviani et al., 2018) which suggests that traditional pedagogies often contribute to the perception of mathematics as a rigid and unapproachable subject.

With the introduction of Discovery Learning, students began to take a more active role in the learning process. The method's structured phases—stimulation, problem formulation, data gathering, data processing, verification, and generalization—provided a scaffolded yet flexible learning environment where students could explore mathematical concepts through real-world problems and collaborative discussion. During Cycle I, it became apparent that students were gradually adjusting to the new model; participation began to increase, although some students still displayed hesitation when engaging with unfamiliar problems. Observational data highlighted modest gains in classroom interaction, and post-test results showed an improvement in performance. However, reflective evaluation at the end of the first cycle indicated that students needed more guidance in transitioning from traditional passive learning to an active discovery approach. This insight informed the planning for Cycle II, where modifications were made, including the use of more contextual learning media and clearer problem prompts that encouraged peer collaboration.

In Cycle II, the learning environment evolved noticeably. Students were more confident in articulating mathematical reasoning, group discussions became livelier, and classroom observations revealed that learners took initiative in asking questions and exploring alternative solutions. The post-test results validated this progress, with the average score increasing dramatically to 83.38. More importantly, over 85% of the students were now categorized under "developing" and "very developing" levels, indicating that both cognitive understanding and learning motivation had improved significantly. These findings support the theoretical underpinnings of the constructivist model, which posits that learners construct knowledge more effectively when they are engaged in active inquiry and reflection. The shift from a teacher-

centered to a student-centered paradigm allowed learners not only to grasp mathematical concepts more deeply but also to develop soft skills such as collaboration, critical thinking, and confidence in problem-solving.

Furthermore, the study aligns with empirical research such as that by Maisari & Usman (2024), who highlighted that integrating interactive tools like GeoGebra within Discovery Learning frameworks significantly increased student engagement and interest. Although this study did not integrate digital tools, it reaffirmed that the process of guided discovery itself—when implemented systematically—can transform students' attitudes towards learning. It also reinforces the view of Khasinah (2021), who argued that learning becomes more meaningful when students are given the autonomy to explore and reflect, rather than being passive recipients of knowledge.

The role of the teacher was instrumental throughout the process. As a facilitator, the teacher not only guided students in navigating through discovery phases but also provided emotional and cognitive support when students faced difficulties. The implementation of rewards during both cycles also helped to increase extrinsic motivation, particularly among students who initially lacked confidence. The dual strategy of combining structured autonomy with motivational reinforcement proved effective in building a more inclusive and dynamic learning environment. It is worth noting, however, that a small percentage of students still fell under the "less developed" category by the end of Cycle II. This indicates that while Discovery Learning is broadly effective, it may require additional differentiation or support mechanisms to accommodate learners with lower baseline skills or learning anxieties.

Overall, this study underscores the transformative potential of the Discovery Learning model in improving both interest and academic performance in elementary mathematics. By fostering an active, student-centered learning atmosphere, it contributes to the broader goals of the Merdeka Belajar curriculum, which emphasizes student autonomy, contextual learning, and the development of higher-order thinking skills. The implications for teaching practice are substantial: teachers should be encouraged and trained to adopt inquiry-based approaches and continuously reflect on their pedagogy through classroom action research. As demonstrated, even modest changes in instructional design—when informed by reflective cycles—can yield significant educational gains.

.Conclusion

The implementation of the Discovery Learning model in this classroom action research significantly improved students' interest and achievement in learning mathematics at SD Kartika I-1 Medan. The shift from passive to active learning through structured exploration, discussion, and problem-solving enabled students to engage more deeply with mathematical concepts and fostered greater motivation and confidence. The increase in average scores from 39.26 to 83.38 and the rise in students reaching the "developing" and "very developing" categories confirm the effectiveness of this approach. Thus, Discovery Learning proves to be a practical and impactful model for enhancing mathematics learning in primary education settings.

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