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The Influence of the Discovery Learning Model and Creative Thinking Skills on the Science Learning Outcomes of Grade IV Elementary School Students in Muntok District

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Abstrak

Pendidikan merupakan hal yang terpenting dan memegang peranan dalam memajukan nasib suatu bangsa. Pendidikan juga merupakan pembelajaran suatu pengetahuan, keterampilan dan kebiasaan dari kelompok individu yang bermula dari generasi kepada generasi berikutnya. Maksudnya adalah bahwa pendidikan terdiri dari rangkaian kegiatan seorang individu kepada individu lain atau secara kelompok dengan bimbingan agar anak tumbuh dan berkembang optimal secara mandiri dan bertanggung jawab. Penelitian ini bertujuan meningkatkan keterampilan berpikir kreatif yaitu model discovery learning, dengan dilaksanakan motode eksperimen. Penelitian ini bertujuan meningkatkan keterampilan berpikir kreatif yaitu model discovery learning, dengan dilaksanakan motode eksperimen. hasil penelitian menunjukkan bahwa 1) terdapat perbedaan hasil belajar IPA peserta didik yang menggunakan model Discovery Learning lebih tinggi dibanding dengan yang belajar menggunakan model konvensional. 2) Terdapat interaksi antar model pembelajaran discovery learning dengan model pembelajaran konvensional ditinjau dari berpikir kritis terhadap hasil belajar IPA peserta didik. 3) Terdapat perbedaan hasil hasil belajar IPA peserta didik yang memiliki kemampuan berpikir kritis tinggi yang belajar dengan menggunakan model discovery learning lebih tinggi dari peserta didik yang belajar dengan model pembelajaran konvensional. 4) Teradapat perbedaan hasil belajar IPA peserta didik yang memiliki berpikir kritis rendah yang belajar dengan menggunakan model pemebelajaran discovery learning lebih tinggi dari peserta didik yang belajar dengan model pembelajaran konvensional.

Kata Kunci: Model Pembelajaran Discovery Learning, Berpikir Kreatif, Hasil Belajar

Abstract

Education is the most important thing and plays a role in advancing the fate of a nation. Education is also the learning of knowledge, skills and habits from a group of individuals starting from generation to generation. The point is that education consists of a series of activities from one individual to another individual or in groups with guidance so that children grow and develop optimally independently and responsibly. This research aims to improve creative thinking skills, namely the discovery learning model, by implementing an experimental method. This research aims to improve creative thinking skills, namely the discovery learning model, by implementing an experimental method. The results of the study show that 1) there is a difference in the learning outcomes of science students who use the Discovery Learning model higher than those who learn using the conventional model. 2) There is an interaction between the discovery learning model and the conventional learning model reviewed from critical thinking on students' science learning outcomes. 3) There is a difference in the learning outcomes of science students who have high critical thinking skills who learn using the discovery learning model are higher than students who study with the conventional learning model. 4) There is a difference in the learning outcomes of science students who have low critical thinking who learn using the discovery learning model higher than students who study with the conventional learning model.

***Keywords**: Discovery Learning Model, Creative Thinking, Learning Outcomes*

Research Background

Education, in its broadest sense, is a deliberate process designed to bring about positive changes in learners' knowledge, skills, attitudes, and behaviors. Learning is not merely the transfer of information but a transformative journey that takes individuals from "not knowing to knowing" and "from not understanding to understanding" (Muhyidin & Masrupi, 2018). Through this process, students are encouraged to develop new perspectives, refine their abilities, and construct meaningful knowledge that shapes both their intellectual growth and daily behavior (Setiawati, 2018).

In the context of primary education, Natural Sciences (Science) plays a crucial role in fostering scientific literacy and equipping students with 21st-century skills. Science education helps children develop the capacity for inquiry, critical thinking, and creativity, all of which are necessary for problem solving in an increasingly complex world. As noted by Tulljanah & Amini (2021), effective science learning requires pedagogical approaches that emphasize higher-order thinking skills (HOTS), enabling students to engage deeply with scientific concepts. These skills not only enhance academic performance but also cultivate adaptability and creativity to face future challenges (Mulyadinata et al., 2023).

Despite this potential, many elementary school students in Indonesia, including those in Muntok District, continue to demonstrate relatively low learning outcomes in science. Several factors contribute to this condition, ranging from limited instructional models and monotonous teaching methods to low levels of student creativity. According to Kurniawan et al (2018), learning achievement is influenced by both internal factors—such as health, intelligence, interest, motivation, and readiness—and external factors, including family environment, social interactions, and school facilities. These multidimensional challenges underscore the urgency of adopting more innovative teaching approaches.

In many classrooms, learning activities remain teacher-centered, focusing on the transfer of knowledge rather than active student engagement. Such conditions limit students' opportunities to think independently, explore phenomena, and construct their own understanding of scientific concepts. Practical activities, however, have proven effective in enhancing both learning outcomes and creativity, as demonstrated by Huda & Fatonah (2023) and Fitria & Romadin (2023). Project-based learning approaches also encourage students to apply knowledge to real-world problems, thereby supporting collaboration, problem-solving, and critical thinking (Abida et al., 2022).

One learning model that aligns with these demands is the Discovery Learning model. This model is designed in such a way that learners are guided to explore, investigate, and discover concepts independently. Bruner (as cited in Ilhan & Ekber Gülersoy, 2019) emphasized that discovery learning is a motivating strategy, realized through students' active involvement and direct observation. Sunarto & Amalia (2022) also explained that discovery learning does not simply provide ready-made knowledge, but instead requires learners to structure and develop their own understanding through problem-solving activities. In addition, Kristin (in Cintia et al., 2018) highlights that discovery learning is characterized by student-centered learning, exploration of problems, and the integration of prior knowledge with new information.

Another key variable related to students' science achievement is creative thinking skill. Wahyuni & Kurniawan (2018) define creative thinking as the ability to generate new, original, flexible, and elaborative ideas. Similarly, Moma (in Qomariyah & Subekti, 2021) views creative thinking as the capacity to analyze new information and combine unique ideas to solve problems, while Siswono & Novitasari (in Cintia et al., 2018) describe it as a process of generating multiple possible solutions through divergent thinking. Students with higher levels of creative thinking are generally more adept at constructing knowledge and applying scientific concepts in diverse contexts.

Although several studies have explored the impact of discovery learning and creative thinking skills on student achievement, research focusing on primary schools—especially in the context of Muntok District—remains limited. Most studies have been conducted at higher levels of education or have examined these variables separately, without analyzing their combined effect on science learning outcomes. This gap provides an opportunity to conduct research that integrates both aspects to obtain a more comprehensive understanding.

Therefore, the purpose of this study is threefold: (1) to investigate the influence of the Discovery Learning Model on the science learning outcomes of fourth-grade students in Muntok District; (2) to examine the influence of creative thinking skills on students' science learning outcomes; and (3) to analyze the simultaneous influence of the Discovery Learning Model and creative thinking skills on science learning outcomes. The findings are expected to contribute both theoretically, by enriching scientific discourse on innovative learning models, and practically, by serving as a reference for teachers and schools to enhance science learning and cultivate 21st-century skills in primary education.

Method

This study employed a quantitative approach with a quasi-experimental design. The design was chosen to examine the effect of the Discovery Learning model and students' creative thinking skills on science learning outcomes by comparing two groups: the experimental class and the control class. The experimental class received instruction using the Discovery Learning model, while the control class was taught through conventional teaching methods.

To strengthen the research design, each class was further categorized based on students' level of creative thinking skills, namely those with high creative thinking ability and those with low creative thinking ability. This categorization allowed the researcher to analyze the effect of the independent variables both individually and simultaneously on science learning outcomes.

The population of this study consisted of fourth-grade elementary school students in Muntok District. Sampling was carried out using the cluster random sampling technique, which is appropriate when the population is grouped into clusters with relatively similar characteristics but internal diversity. This technique ensured that the sample was representative of the larger population while maintaining feasibility in classroom-based research.

The selected sample was then analyzed according to predetermined parameters. Data collection involved the administration of science learning outcome tests and creative thinking skill assessments. The results were subsequently processed using appropriate statistical tests to determine the influence of the Discovery Learning model and creative thinking skills, both partially and simultaneously, on students' science learning outcomes.

Result and Discussion

Differences in Science Learning Outcomes between Discovery Learning and Conventional Models

The findings revealed a significant difference in science learning outcomes between students taught using the Discovery Learning model and those taught using conventional approaches. Results from the Independent Sample Test produced a significance value of 0.000 ($p < 0.05$), indicating that the experimental group outperformed the control group. This conclusion is further supported by the mean scores, where the experimental class achieved an average of 77.83 compared to 61.09 in the control class. These results suggest that Discovery Learning creates a more engaging environment, allowing students to be active participants in constructing their knowledge rather than passive recipients.

This result aligns with Slameto's perspective (in Kurniawan et al., 2018) that the use of appropriate instructional models is a key factor influencing student achievement. Similarly, Rahayu et al (2023) emphasize that discovery-based strategies encourage active learning, improve comprehension, and positively affect outcomes. The implication is clear: when teachers act as facilitators guiding inquiry and exploration, students' cognitive engagement deepens, leading to improved performance in science. These findings resonate with the broader discourse on science education in elementary schools, which underscores the necessity of fostering scientific literacy and 21st-century competencies (Mulyadinata et al., 2023; Tulljanah & Amini, 2021).

Influence of Creative Thinking Skills on Science Learning Outcomes

The study also demonstrated that students with higher creative thinking skills achieved significantly better results than those with lower creative thinking skills. The Independent Sample Test reported a significance value of 0.001 ($p < 0.05$), confirming the difference. The average science score of students with high creative thinking skills was 85.62, while those with lower creative thinking ability scored 50.00. This

substantial gap highlights the critical role of creativity in learning science.

These results support the view of Sahwari & Dassucik (2022), who argue that creativity fosters flexibility, originality, and problem-solving skills essential for mastering scientific concepts. Moreover, prior research has shown that practical and project-based learning activities can cultivate creativity, thereby strengthening students' grasp of science while making learning more meaningful (Faurisiawati et al., 2022; Huda & Fatonah, 2023). By contrast, rigid and teacher-centered methods tend to limit opportunities for exploration and imaginative thinking (Saeed & Ramdane, 2022). Thus, improving creative thinking skills should be an instructional priority to optimize science learning outcomes.

Interaction Effect between Discovery Learning and Creative Thinking Skills

The two-way ANOVA analysis revealed a significant interaction between the Discovery Learning model and creative thinking skills, with a significance value of 0.026 ($p < 0.05$). This finding indicates that the effectiveness of Discovery Learning in improving science learning outcomes is amplified when students possess higher creative thinking abilities. In other words, the model and creativity do not work in isolation; they mutually reinforce each other.

Students with high creative thinking skills benefit more from Discovery Learning because the model emphasizes inquiry, experimentation, and reflection. As Puspitasari & Nurhayati (2019) suggest, this approach fosters self-concept, independence, and confidence in collaborative problem-solving. Wanelly & Fauzan (2020) further note that flexibility—a hallmark of creative thinking—enables students to approach problems from multiple perspectives, thereby enriching their scientific understanding. Similarly, Zainuri et al (2022) confirm that the interaction between innovative teaching models and creative skills significantly enhances learning outcomes.

Broader Implications for Science Education in the 21st Century

These findings hold broader significance in the context of elementary science education. Developing scientific literacy and creativity is not only about academic success but also about preparing students for life in the 21st century. Practical activities, project-based learning, and interdisciplinary approaches such as STEAM have been recognized as powerful methods for integrating knowledge with real-world applications (Anggrella et al., 2024). Such approaches foster collaboration, communication, and problem-solving skills, which are vital for navigating today's complex societal and technological challenges.

At the same time, the results highlight persistent issues in classrooms, such as the reliance on conventional methods that limit creativity and engagement. Research has emphasized the need for more diverse and innovative teaching strategies, including formative assessments and feedback mechanisms, to provide students with the tools and motivation to improve (Bolden et al., 2019; Kiraga, 2023). By creating supportive, resource-rich environments where students feel encouraged to experiment and take risks, teachers can significantly enhance learning outcomes and stimulate creativity (Ramadhanti et al., 2019).

Synthesis and Conclusion of the Findings

Taken together, the results demonstrate three key points. First, the Discovery Learning model significantly improves science learning outcomes compared to conventional teaching methods. Second, creative thinking skills strongly influence students' academic achievement in science, with higher creativity correlating with better performance. Third, there exists a meaningful interaction between Discovery Learning and creative thinking, suggesting that the benefits of the model are maximized when paired with strong creative competencies.

These findings are consistent with the growing body of literature emphasizing that science education should not be confined to rote memorization or teacher-centered methods. Instead, it should aim to cultivate inquiry, creativity, and problem-solving abilities that are central to 21st-century skills. Addressing low performance in science thus requires holistic reforms that combine innovative pedagogy, the cultivation of creativity, and supportive classroom environments. By adopting such approaches, educators can ensure that science education at the elementary level not only enhances academic outcomes but also prepares students for lifelong learning and meaningful participation in society.

Conclusion

The findings of this study demonstrate that the Discovery Learning model has a significant positive impact on the science learning outcomes

of fourth-grade students in Muntok District. Students taught using this model achieved higher average scores compared to those taught with conventional methods, highlighting the importance of active, inquiry-based strategies in fostering deeper understanding of scientific concepts. In addition, students with high creative thinking skills consistently outperformed those with lower levels of creativity, underscoring the role of divergent thinking, originality, and flexibility in enhancing academic achievement.

Furthermore, the analysis revealed a meaningful interaction between the Discovery Learning model and creative thinking skills, showing that the benefits of discovery-based approaches are amplified when students possess stronger creative abilities. These results suggest that improving science education in elementary schools requires not only the adoption of innovative pedagogical models but also the cultivation of creativity as a core competency. Together, these elements contribute to the development of scientific literacy and 21st-century skills, equipping students to face complex challenges and apply their knowledge in meaningful, real-world contexts.

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