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The Effect of Dakon Learning Media in Improving Critical Thinking Skills of Elementary School Students

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Abstract
Education plays a vital role in shaping human resources in the 21st century, particularly in developing students' critical thinking skills. However, the critical thinking skills of elementary school students, especially in mathematics, remain relatively low. This is evident from various previous studies as well as Indonesia's 2022 PISA results. Therefore, the use of concrete learning materials—specifically the dakon—is necessary as a learning aid. This study aims to determine the effect of the dakon learning medium on the critical thinking skills of elementary school students. The research method used was a Systematic Literature Review (SLR) by examining 32 relevant Sinta-indexed articles from the past 10 years using the PRISMA diagram. The results of the study indicate that the use of the dakon medium has a positive effect on improving students' critical thinking skills in elementary school mathematics learning. Thus, the dakon medium can be used as an alternative concrete learning medium to improve students' critical thinking skills.
Keywords: *Dakon, Critical Thinking Skills, Mathematics, Elementary School*

Abstrak
Pendidikan berperan penting dalam membentuk sumber daya manusia di abad ke-21 terutama dalam mengembangkan kemampuan berpikir kritis peserta didik. Namun, kemampuan berpikir kritis peserta didik sekolah dasar, khususnya pada mata pelajaran matematika, masih tergolong rendah. Hal ini terlihat dari berbagai penelitian sebelumnya serta hasil PISA 2022 Indonesia. Oleh karena itu, diperlukan penggunaan media konkret yaitu media dakon sebagai alat bantu pembelajaran. Penelitian ini bertujuan untuk mengetahui pengaruh media pembelajaran dakon terhadap kemampuan berpikir kritis peserta didik sekolah dasar. Metode penelitian yang digunakan adalah *Systematic Literature Review* (SLR) dengan menelaah 32 artikel relevan terindeks sinta selama 10 tahun terakhir melalui diagram PRISMA. Hail penelitian menunjukkan bahwa penggunaan media dakon berpengaruh positif terhadap peningkatan kemampuan berpikir kritis peserta didik dalam pembelajaran matematika sekolah dasar. Dengan demikian, media dakon dapat digunakan sebagai alternatif media pembelajaran konkret untuk meningkatkan kemampuan berpikir kritis peserta didik.
Kata kunci: *Dakon, Kemampuan Berpikir Kritis, Matematika, Sekolah Dasar*

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INTRODUCTION

Education plays a vital role in shaping human resources in the 21st century. Elementary school serves as the foundational level for students to develop 21st-century skills, commonly referred to as the 4Cs. These 4Cs include critical thinking, creativity, communication, and collaboration (Nuryati et al., 2026). These four skills are viewed as core competencies that are interrelated and need to be developed in an integrated manner through the learning process. In developing critical thinking skills, students must also possess critical thinking abilities. Critical thinking ability is essential for problem-solving and making informed decisions (Dores et al., 2020). In line with (Isa et al., 2026), the demands of the 21st century are expected to foster students' critical thinking abilities, particularly in mathematics education.

Critical thinking is a fundamental skill and ability that humans possess to think intellectually, rationally, and dynamically (Gapari, 2025). According to (Hasanah et al., 2023), critical thinking is a person's ability to analyze, evaluate, and draw conclusions about information or problems logically, rationally, and objectively based on available evidence so that it can be used to make decisions and solve problems appropriately. Meanwhile, according to (Fitriani et al., 2021), critical thinking is the ability to think deeply, enabling students to evaluate various pieces of evidence and logical arguments used in problem-solving. Thus, it can be synthesized that critical thinking is a fundamental ability for an individual to think logically, rationally, and deeply when analyzing, evaluating, and drawing conclusions from information to solve problems and make decisions accurately. Based on this definition, critical thinking skills are important for students so that they can make the right and correct choices and adjust their attitudes based on logic (Taufik & Ashari, 2025).

In fact, the critical thinking skills of elementary school students remain relatively low. Students tend to memorize formulas without understanding the underlying concepts and struggle to analyze and solve problems related to everyday life. This aligns with research (Salsabila et al., 2026), which found that elementary school students' understanding of division remains low and that they tend to memorize steps without grasping the meaning of division. Additionally, research (Yuspitasari & Peterianus, 2026) also indicates that students tend to memorize steps without truly grasping the underlying principles of division. This aligns with cognitive development theory, which explains that third-grade students still require more concrete learning. This explanation is supported by (Nasution & Sari, 2026), who state that at the concrete operational stage, students find it easier to understand concepts through real objects that can be seen, touched, and manipulated. Essentially, students are not yet able to understand abstract concepts without the aid of concrete media.

Furthermore, this low level of critical thinking is also evident in the results of the 2022 PISA assessment in Indonesia, which show that students' ability to solve reasoning-based problems remains in the low category (OECD, 2023). A total of 73% of Indonesian students are at Level 1 or below in numeracy (Kamaludin, 2025). This indicates students' inability to solve basic real-life problems. Level 1 or below also indicates that students lack basic skills in solving mathematical problems. Some contributing factors include the lack of connection between math problems and real-world contexts, the dominance of rote memorization methods, a focus solely on algorithmic practice, and a lack of teacher training in problem-solving approaches.

The low level of critical thinking skills is consistent with the findings of a study (Yulianingsih et al., 2025), in which the critical thinking skills test on whole number arithmetic operations for third-grade students at MIN 6 North Lampung fell into the low category. Approximately 32.25% of students could provide a simple explanation, 42.4% could develop basic skills, 30.41% could draw conclusions, 29.56% could provide further explanations, and 31.08% could devise strategies and tactics. The average score

obtained based on the five critical thinking indicators was 33.19%, which falls into the low category. The factors influencing this low level of critical thinking ability are also diverse, namely the lack of student engagement in the learning process, students' reluctance to ask questions, students' reluctance to answer questions, and students' reluctance to express their ideas.

Furthermore, a study (Pangesti et al., 2025) conducted in the third grade at MI Alhuda Rawasapi revealed low mathematical problem-solving skills among students, particularly regarding number concepts. Based on an analysis using Polya's four-step approach—understanding the problem, planning a solution, executing the plan, and checking the result—it was found that students faced difficulties at nearly every stage. The errors stemmed from misreading the problem, misunderstanding the problem, transforming it into a mathematical form, performing the calculation process, and writing the final answer. The factors contributing to these issues included low mathematical literacy, limited abstract thinking, and a lack of practice in solving story-based problems independently and reflectively.

Meanwhile, in a study by (Ariyandi et al., 2025), preliminary observations at SDN 68 Palembang revealed that students lacked understanding and interest in the mathematics curriculum. This was attributed to teachers relying solely on conventional teaching methods, which made it difficult for students to grasp the material being taught. In addition to several issues identified in the literature review, the researcher conducted an initial interview with a teacher at SD Negeri 4 Kartasura. The interview revealed that third-grade students still exhibit low thinking skills, particularly in mathematics. This is partly due to the parenting styles of each student's family.

Therefore, based on the root of the problem, a solution is needed to improve students' critical thinking skills. One possible solution is the use of concrete teaching aids that relate to students' real lives. One such concrete teaching aid is the dakon or congklak game. This medium can provide a tangible experience for students in learning the material. Dakon itself is a traditional game that can develop children's counting skills. The benefits of dakon include stimulating fine motor skills, numerical abilities, and training students' concentration (Santi & Yusri Bachtiar, 2020). Based on these underlying issues, this study is important to ensure that the challenges faced by students—particularly in the mathematics subject regarding division—can be effectively addressed using the dakon game and serve as a reference for future researchers to further develop this approach.

Based on several previous studies, researchers have examined the use of dakon as a mathematics learning medium in elementary schools; however, the application of this medium varies, and not all previous researchers have used critical thinking ability as a dependent variable. For example, a study by (Savriliana et al., 2020) showed that the dakon medium can improve the learning outcomes of third-grade students in the areas of KPK and FPB. The dakon game can help and make it easier for students to understand mathematical calculation concepts while also making them enjoy the process due to its playful elements. Additionally, in a study conducted by (Riyaya et al., 2024), the smart dakon media based on the PBL model was found to effectively improve mathematics learning outcomes. This is evident from students' ability to convert units of length and solve problems related to the relationships between units of length in daily life. Based on the posttest scores, which were higher than the pretest scores—specifically, 53.89% increased to 82.22%—it is evident that the smart unit dakon media based on the PBL model is effective in improving third-grade mathematics learning outcomes.

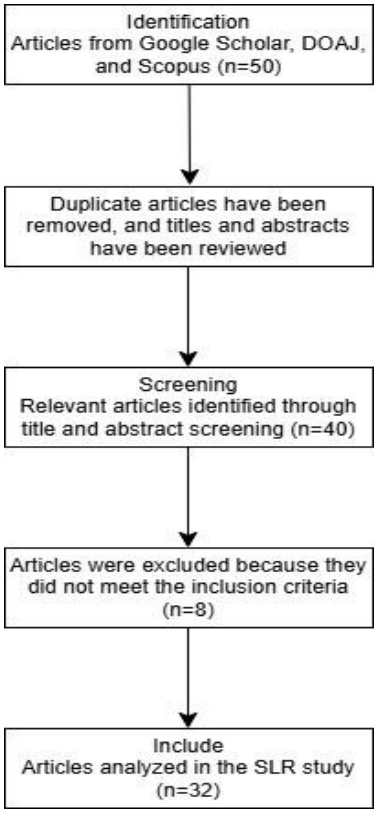
Based on several previous studies, the use of dakon as a mathematics learning medium in elementary schools can assist students in the learning process. However, the application of this medium varies, and not all previous researchers have used critical thinking ability as a dependent variable. The effect of the dakon medium on critical

thinking skills aligns with the benefits of the dakon game, in which students are presented with a game that requires the ability to identify and analyze problems in accordance with the indicators of critical thinking skills by Facione (Kurniawati et al., 2020). This study aims to determine the effect of the dakon learning medium on students' critical thinking skills in mathematics at the elementary school level. This study also introduces a novelty by linking the dakon learning medium to critical thinking skills in mathematics, specifically in the area of division.

METHOD

This study employs a Systematic Literature Review (SLR) method using the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) approach. PRISMA is a set of evidence-based minimum reporting standards designed to assist authors in reporting various systematic reviews and meta-analyses that assess benefits (Simamora et al., 2024). The primary objective of PRISMA is to provide a clear reporting framework for literature reviews, spanning from the initial search and selection process to the final results of the included studies. The stages outlined in the PRISMA diagram include identification, screening, and inclusion (Utami et al., 2021).

The identification process was conducted by searching for articles in several databases, such as Google Scholar, DOAJ, and Scopus, using keywords relevant to the research topic. Based on this identification process, 50 articles were identified; these were then screened by removing duplicates and reviewing the titles and abstracts. After selection, there were 40 relevant articles, and those meeting the criteria were further analyzed through a feasibility stage until relevant articles were obtained to serve as sources for this study. Consequently, the data used comprised 32 relevant articles based on the content of their discussions.



Picture 1. PRISMA Diagram for the SLR Method

RESULT AND DISCUSSION

Based on a literature review, the researchers selected several studies relevant to this study. These studies are as follows:

Table 1. Findings on Dakon Media in Improving Critical Thinking Skills

No	Author and Year	Research Title	Research Content
1.	(Riyaya et al., 2024)	Efektivitas Penggunaan Dakon Satuan Pintar Berbasis PBL Dalam Meningkatkan Hasil Belajar Matematika Siswa Kelas III	The use of the PBL model with the help of Smart Dakon Units (DAKOTA) can improve critical thinking skills because students can be actively involved in using this media.
2.	(Ardhia et al., 2019)	Pengaruh Media Dakota Terhadap Kemampuan Berpikir Kritis Materi KPK FPB Kelas IV SDN 01 Gemuhblanten	Dakota media has an effect on increasing students' enthusiasm for KPK and FPB material, thereby improving their critical thinking skills.
3.	(Baitanu et al., 2024)	Peningkatan Hasil Belajar Siswa Kelas IV Pada Mata Pelajaran Matematika Tentang KPK dan FPB Melalui Model Discovery Learning Berbantuan Media Dakon Angka Di SD Negeri Koko	Dakon media can improve the learning outcomes of grade IV students on KPK and FPB material, where critical thinking skills also increase.
4.	(Adwitiya et al., 2025)	The Effect of Mathematical Dakon Media on the Multiplication Operation Ability of Whole Numbers in Grade 4 Madrasah Ibtidaiyah Students	The use of mathematical dakon media has been proven to be effective and significantly improve the multiplication operation ability of whole numbers in fourth-grade Madrasah Ibtidaiyah students. This is demonstrated by an increase in learning outcomes.
5.	(Sujaryanto, 2025)	Implementation Of Dakon Game in Elementary School Mathematics Learning	The dakon game is effective as a medium for mathematics learning in elementary schools because it helps students understand integer calculations in a more concrete, enjoyable, and meaningful way.
6.	(Darmayanti & Farida, 2025)	Permainan Tradisional Dakon untuk Meningkatkan Kemampuan Berhitung Dasar dan Keterampilan Sosial Siswa Kelas 2 SD (SDGs 4 & SDGs 3)	The use of the traditional game of dakon to improve second-grade elementary school students' basic math skills and social skills. Research shows that the game of dakon can

			help students improve their addition and subtraction skills while also fostering cooperation, communication, and social interaction among students.
7.	(Winoto & Prasetyo, 2020)	Efektivitas Model Problem Based Learning dan Discovery Learning terhadap Kemampuan Berpikir Kritis Siswa Sekolah Dasar	The effectiveness of the Problem-Based Learning (PBL) and Discovery Learning models on elementary school students' critical thinking skills in mathematics. The results of the study indicate that the Discovery Learning model is more effective than PBL in improving students' critical thinking skills and mathematics achievement.
8.	(Pratiwi, 2020)	Penerapan Model Pembelajaran Inquiry dan Discovery Learning Ditinjau dari Keterampilan Berpikir Kritis	A Comparison of the Inquiry and Discovery Learning Models on Students' Critical Thinking Skills in Fourth-Grade Elementary School Mathematics. The results of the study indicate that the Inquiry model is more effective in improving critical thinking skills than the Discovery Learning model.
9.	(Elena & Sekarinasih, 2026)	Efektivitas Media Dakon dalam Meningkatkan Kemampuan Pemahaman Matematika Siswa	The effectiveness of the dakon game as a teaching tool in improving third-grade students' mathematical comprehension of multiplication and division. The results of the study indicate that the use of the dakon game is more effective than conventional methods in improving students' mathematical comprehension.

Based on the literature review above, the dakon medium has been shown to help students improve their learning outcomes in several mathematics topics across various grade levels. This improvement in learning outcomes also indicates an enhancement in critical thinking skills. This aligns with the research (Riyaya et al., 2024) showing that the smart dakon medium can improve students' understanding of mathematical concepts, as evidenced by improved mathematics learning outcomes. The direct use of the dakon medium in this study also highlights the role of the PBL model in fostering students' critical thinking skills, as evidenced during the learning process.

Previous research findings indicate an improvement in students' mathematics learning outcomes, serving as an indicator of enhanced critical thinking skills due to the implementation of the Problem-Based Learning (PBL) model. The study also indicates that the PBL model can improve students' problem-solving skills, as evidenced by improved mathematics learning outcomes. This aligns with critical thinking skills, which are cognitive abilities to analyze and solve problems in a reflective, logical, and purposeful manner (Fitriyah & Ramadani, 2021).

The use of the dakon game as a mathematics learning aid can also develop logic, strategies, and problem-solving skills through enjoyable activities, as supported by research (Sujaryanto, 2025). The dakon game supports cognitive development by sharpening numerical reasoning and calculation, particularly in repetitive operations such as addition and subtraction. This aligns with research (Darmayanti & Farida, 2025) showing that the dakon game is effective in improving basic calculation skills and social skills among second-grade elementary school students.

In addition to improving children's arithmetic skills in basic operations, the dakon game is also known to assist in teaching the KPK and FPB concepts to fourth-grade students at SDN 1 Gemuhblanten (Ardhia et al., 2019). This is evidenced by the summary of critical thinking scores on the pretest and posttest, which indicate an improvement in critical thinking skills on the posttest following the intervention. Students were highly enthusiastic about the learning process; they actively participated in question-and-answer sessions with the teacher; they were able to clearly understand the material; they actively sought information from the dakon media; they were able to distinguish between factors and multiples; and they were able to perform multiplication and division. The characteristics of students when using the Dakota media align with those of students possessing critical thinking skills, where students can pose questions and problems, as well as collect and evaluate relevant information (Kholid, 2024). The students' enthusiasm in using the Dakota media also indicates that they are more meticulous and critical during discussions.

Improvements in learning outcomes for KPK and FPB material were also observed in a study (Baitanu et al., 2024) that employed a discovery learning model supported by the Dakon number media at Koko State Elementary School. The study results showed an improvement in Cycle II compared to Cycle I. In Cycle I, the average score achieved by students was 64.58 with a classical mastery rate of 33.33%. In Cycle II, both the average score and the students' classical mastery rate improved. The average score in Cycle II was 78.33 with a classical mastery rate of 79.16%. Thus, it can be concluded that the application of the discovery learning model using the dakon game can improve learning outcomes in mathematics for the KPK and FPB topics.

The application of the discovery learning model in mathematics instruction has been proven to improve learning outcomes. This aligns with research (Winoto & Prasetyo, 2020), which states that discovery learning has a positive impact on students, thereby enhancing their critical thinking skills and learning outcomes when implemented. This is reinforced by the fact that the discovery learning model emphasizes student activities in learning, so that during the learning process, students will discover concepts and theorems, algorithmic procedures, and the like (Pratiwi, 2020).

In addition to the KPK and FPBtopics, the dakon game has also been proven to improve learning outcomes in the multiplication of whole numbers. This aligns with research (Adwitiya et al., 2025) showing that the dakon game can help students understand multiplication concepts in a concrete, contextual, and enjoyable manner. In addition to improving learning outcomes, the use of the dakon medium also fosters student activity, motivation, and engagement in mathematics learning rooted in local culture. The dakon medium used aligns with the purpose of learning media, which is to

convey learning content, thereby capturing students' attention, interest, thoughts, and emotions during learning to achieve learning objectives (Ammara Jauza & Albina, 2025).

Data analysis conducted by (Elena & Sekarinasih, 2026) also indicates that the dakon learning medium has proven effective in enhancing third-grade students' mathematical understanding at MI Muhammadiyah Toyareka. This demonstrates that the dakon medium can serve as a learning aid not only for arithmetic operations but also for other topics. Previous studies have shown that the dakon learning medium can improve critical thinking skills, learning outcomes, and comprehension of the presented material. Therefore, the dakon medium not only functions as a concrete and enjoyable learning aid but also creates an active, interactive, and student-centered learning environment. Through play-based learning activities, students are trained to think logically, analyze problems, determine strategies, and find solutions both independently and collaboratively with their peers.

Based on the findings from these previous studies, the use of the dakon game in mathematics instruction holds significant potential for application in this research. The dakon game is expected to help students understand concepts more concretely, increase student engagement in the learning process, and foster the development of critical thinking skills through problem-solving activities conducted during instruction.

CONCLUSION

Based on the results of the literature review, the dakon learning medium has been shown to have a positive impact on improving the critical thinking skills of elementary school students in mathematics. The use of the dakon game helps students understand mathematical concepts concretely, increases learning engagement, problem-solving skills, and learning outcomes across various topics such as arithmetic operations, multiplication, division, KPK, and FPB. Additionally, dakon-based learning creates a fun, interactive learning environment and fosters students' social skills. The implications of this study indicate that the dakon game can serve as an innovative and contextual learning medium to support mathematics education in elementary schools, particularly in enhancing students' critical thinking skills. Therefore, teachers are encouraged to utilize the dakon game as a concrete learning tool in the instructional process. Further research is recommended to explore the application of the dakon game across different subject areas and educational levels, and to test its effectiveness through direct experimental studies.

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