



## Development of Dorama card learning to improve critical thinking skills

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### ABSTRACT

Students have difficulty understanding Science learning due to a lack of attractiveness in learning. Therefore, this study aims to develop science learning media with Domino Rantai Makanan (Dorama) cards. The research used the Research and Development (RnD) method with the ADDIE development model. Data collection techniques include observation, interviews, questionnaires, (pre-test and post-test), and validation sheets from media and material experts. Data analysis was conducted using the N-gain test to measure the increased critical thinking. The results of media and material expert validation showed a very high level of validity. At the same time, the teacher's response proved that the Dorama card media was well received. Furthermore, the increase in students' critical thinking skills was significant. This research confirms that Dorama card learning media can encourage learning attractiveness. In addition, it provides student learning experiences in the form of connecting theory with practice through visualization and logical analysis, providing meaningful learning experiences and encouraging students to think critically by identifying cause-and-effect, testing hypotheses, and concluding grade V students of UPTD SDN 018452, Asahan, North Sumatra.

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### ABSTRAK

Peserta didik kesulitan memahami pembelajaran Ilmu Pengetahuan Alam (IPA) disebabkan kurangnya daya tarik dalam belajar. Maka dari itu, penelitian ini bertujuan untuk mengembangkan media pembelajaran IPA dengan kartu Domino Rantai Makanan (Dorama). Penelitian menggunakan metode Research and Development (RnD) dengan model pengembangan ADDIE. Teknik pengumpulan data meliputi observasi, wawancara, angket, (pre-test dan post-test), serta lembar validasi dari ahli media dan materi. Analisis data dilakukan menggunakan uji N-gain untuk mengukur peningkatan berpikir kritis. Hasil penelitian menunjukkan bahwa hasil validasi ahli media dan materi menunjukan hasil pada tingkat validitas yang sangat tinggi. Sedangkan Respons guru membuktikan bahwa media kartu Dorama diterima dengan baik. Selanjutnya peningkatan kemampuan berpikir kritis peserta didik terlihat signifikan. Penelitian ini menegaskan bahwa media pembelajaran kartu Dorama dapat mendorong daya tarik belajar. Selain itu, memberikan pengalaman belajar peserta didik dalam bentuk menghubungkan teori dengan praktik melalui visualisasi dan analisis logis, memberikan pengalaman belajar yang bermakna dan mendorong peserta didik untuk berpikir kritis dengan mengidentifikasi sebab-akibat, menguji hipotesis, dan menarik kesimpulan Pada peserta didik kelas V UPTD SDN 018452 Asahan, Sumatera Utara.

**Kata Kunci:** berpikir kritis; kartu Dorama; pengembangan media ajar

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## INTRODUCTION

The transformation of adult 21st century education is marked by 21st-century education is marked by continuous development and innovation in learning media that supports student-centered learning. Learning media is a teaching tool and a strategic element in creating a learning experience that can build students' critical thinking, reflective attitudes, and collaborative skills (Tarbiyah et al., 2025). The Kurikulum Merdeka provides space for teachers to assess students' abilities more measurably, aligned with their developmental needs. Learning media are essential for delivering instructional content that fosters students' critical thinking skills (Nuraini et al., 2023). One such medium is *Domino Rantai Makanan* (Dorama) based learning, a visually and narratively driven educational game that directly engages students' cognitive abilities through a communicative and enjoyable approach.

Preliminary observations conducted by the author at UPTD SDN 018452 Karang Anyer, Kisaran City, Asahan Regency, North Sumatra, indicate that students experience difficulties in understanding the interrelationships among components within a rice field ecosystem, particularly in identifying cause-and-effect relationships in food chains and drawing logical conclusions based on the information presented about the paddy field environment. The sense of boredom reported by students is primarily attributed to the teacher's instructional approach, which lacks engagement and remains conventional, relying heavily on lectures and textbook use without variation. Moreover, teachers fail to provide appropriate learning media that align with students' needs and levels of understanding. This absence of suitable and interactive media leads to low learning motivation and limited student engagement during the learning process, ultimately hindering their comprehension of the subject matter.

Science learning, which is supposed to motivate critical thinking, is disappointing (Rofi'ah & Rokhmaniyah, 2024). The critical thinking ability of elementary school students is 4%, while as many as 85% have very low critical thinking skills. The results of the following findings stated that students' critical thinking ability in integrated science lessons only reached 32.5%, and was relatively low in the critical thinking ability of science learning in elementary schools (Amarila et al., 2021). Low critical thinking is because students still rely on memorization and are less familiar with critical thinking (Diatmika & Sudirman, 2024). As a result, it makes it difficult for students to answer questions that require analysis and evaluation.

On the other hand, the problem that often occurs in science learning is that it does not provide opportunities for students to actively develop critical thinking skills to be able to train in problem solving, because the lecture method (*teacher-centered*) is still practiced by many teachers (Handayani et al., 2021; Magdalena et al., 2020). Students should be required to be active and expected to be able to realize the problems faced by themselves in the learning process (Wandini et al., 2021). Students will have difficulty exploring their ability to gain a deep and meaningful understanding (Yusnaldi et al., 2025). Responding to this problem, the innovation of Natural Sciences learning media in Elementary Schools urgently needs innovative, practical, and interactive learning media to bridge the gap between critical thinking and science learning. Learning media development uses Dorama cards.

This media development aims to train students' ability to analyze and solve problems related to the food chain concept, so that their critical thinking skills can be optimally improved. Previous studies on the development of learning media using cards have been carried out with the development of the domino card media in science learning (Istyasiwi et al., 2021). Likewise, research about developing domino card media in social studies learning (Anabella & Wulandari, 2024). Other research develops domino card media in Mathematics learning (Asiya et al., 2024). Another research proves Domino Card Media's validity, practicality, and effectiveness in improving learning outcomes (Khumaeroh et al., 2021; Wiratni et al., 2021).

The difference in this research lies in the material, namely the rice field ecosystem, and to improve the critical thinking skills of students who use Dorama cards, the result of the development of learning media in the form of domino cards. Based on the description above, this paper aims to develop learning media about Dorama cards in science learning rice field ecosystem materials. So that learning objectives are expected to provide interesting learning options for teachers, make students learn more meaningfully, and become a reference for schools. The results of this study try to answer whether the Dorama card learning media is feasible or valid to be used in the rice field ecosystem material, as well as whether there is an increase in students' critical thinking skills after using the Dorama card learning media.

## **LITERATURE REVIEW**

### **Critical Thinking and Science Learning Skills**

Critical thinking is assessing, analyzing, integrating, examining, interpreting, and evaluating information. Critical thinking people will search, analyze, and evaluate information, making conclusions based on facts when deciding on something (Milala et al., 2024). In the context of science education, critical thinking skills are highly relevant because science requires not only the mastery of factual concepts but also the ability to analyze cause-and-effect relationships, interpret data, and draw conclusions based on evidence (Manassero-Mas & Vázquez-Alonso, 2022). Effective science learning encourages students to accept information and examine and test its validity rationally and thoroughly, making critical thinking a fundamental foundation for developing authentic and meaningful scientific understanding (Sutiani, 2021).

Identifying problems, analyzing data, and developing innovative solutions are important to the critical thinking process. Critical thinking seeks to question, research, and test knowledge to draw firm conclusions based on valid evidence and reasoning (Yolanza & Mardianto, 2022). Critical thinking is not only limited to conclusions but also encourages individuals to look at problems from different perspectives to produce more comprehensive solutions. Through critical thinking, a person can think carefully and objectively (Shandy, 2023). Thinking critically is increasingly important and has become a must in daily life. Critical thinking plays an important role in deciphering and understanding the meaning of the information collected and actively seeking, analyzing, and evaluating its truth. Improving students' critical thinking skills aims to get them used to believing something and analyzing it themselves (Huda et al., 2022).

Critical thinking can help you make better decisions, solve problems more effectively, and avoid mistakes. Through critical thinking, it is hoped that students will have scientific traits and the ability to solve problems when learning and facing real problems (Anisa & Siregar, 2024). Critical thinking skills are closely related to science learning, which emphasizes rational problem solving. Science learning aims to equip students with comprehensive scientific skills. Through observation, experimentation, and data analysis, students are trained to think critically, creatively, and systematically in search of answers to questions about the universe. Students naturally explore themselves to gain a deeper understanding of nature based on objective evidence (Khishfe, 2023).

Therefore, through learning science, students gain knowledge about nature and develop skills that are much needed in life by acquiring information, making decisions, and solving problems. Improving students' critical thinking skills can be developed through the use of learning media (Prasasti & Anas, 2023). In science learning, media use is highly recommended because abstract material will be easier to understand by elementary school students who are still in the stage of concrete thinking if visualized through learning media (Arsyad et al., 2024). Using learning media provides students a more realistic learning experience, increasing active involvement in the thinking process, increasing motivation, and enriching the learning experience (Rosyiddin et al., 2023). In other words, innovative learning media can help students, especially in selecting effective learning media, especially in rice field ecosystem materials.

### **Domino Card Learning Media**

Domino cards are a game that uses 28 dotted cards. Each card is divided into two sections containing 0 to 6 points. Domino cards are generally small, yellow, and have a circle motif representing numbers. Domino card media is one of the alternative teaching aids effective in elementary school learning (SD). The domino card contains questions and answers related to the subject matter. This study includes material on the food chain of rice field ecosystems and science subjects. The difference in learning media that the author is trying to develop is the *Domino Rantai Makanan* (Dorama) card, which focuses on rice field ecosystem material. The development efforts carried out refer to the domino card concept that has existed before. Domino games are traditional, simple, competitive, and collaborative games. Dorama is played by matching the sides of the cards based on a specific pattern or number (Istyasiwi et al., 2021).

In Dorama media, the matching principle is adapted into matching between ecosystem components (such as producers, level I and II consumers, and decomposers), so that students are required to understand the flow of the food chain in an ecosystem, not just memorize terms. This game is recreational and educational because it trains systemic, logical, and reflective thinking skills. In a theoretical perspective constructivism learning developed by Piaget and Vygotsky, meaningful learning activities occur when students actively engage and build knowledge through social interaction and environmental exploration. Thus, Dorama functions as a scaffolding tool that allows students to collaboratively explore the concept of rice field ecosystems. The Dorama card learning media aligns with the principles of multiple intelligences of Gardner, where visual and logical forms

of play are well suited for students with logical-mathematical, interpersonal, and visual-spatial intelligence (Widiyatun et al., 2020).

The game also has a social component because it is played in groups, encouraging interaction and discussion between students, which are inseparable in building 21st-century skills (Widiyatun et al., 2020). Learning using domino card media has advantages, including: (1) domino cards can stimulate students' active participation in learning. (2) Cultivate an interactive nature to make learning activities fun and not dull. (3) Practical and portable can stimulate active learning without limiting large spaces. (4) The elements of the domino card game make the learning process more interesting and meaningful. Learning using domino card media trains critical thinking skills, as evidenced in student learning outcomes (Hidayah & Isma, 2018).

## METHODS

The research method employed is Research and Development (RnD), which aims to create or improve a product to be tested in an applied context. The selected research subjects are grade five students at V UPTD SDN 018452 Karang Anyer, East Kisaran City District, Asahan Regency, North Sumatra, which amounted to 33 students, 17 male students, and 16 female students. The object of this study is the Dorama card media on rice field ecosystem material.



**Figure 1.** Addie Model  
Source: Maxnun et al. (2024)

The testing process follows the ADDIE model in **Figure 1**, which consists of five (5) stages: 1) Analysis, 2) Design, 3) Development, 4) Implementation, and 5) Evaluation, applied to the Dorama card media (Maxnun et al., 2024). Data was collected from observations, interviews, student and teacher response questionnaires, tests, validation sheets, and documentation. The data analysis techniques used are qualitative and quantitative data collection. Qualitative data were obtained from material and media experts' validation sheets, as well as questionnaires on student and teacher responses using a Likert scale.



$$\text{Percentage} = \frac{\text{Number of scores obtained}}{\text{maximum score}} \times 100\%$$

The validation results of material experts, media experts, and student and teacher response results will be calculated for validity using the formula above. The total score obtained was then qualitatively interpreted by interpreting the media's validity and practicality assessment score. The criteria of interpreting score is highly invalid and impractical [0%-20%], invalid and impractical [21%-40%], quite valid and reasonably practical [41%--60%], valid and practical [61%-80%], lastly highly valid and very practical [81%-100%] (Wismanto et al., 2022). Next, the pretest and posttest results are calculated using the formula below:

$$N - \text{Gain} = \frac{\text{Skor Post test} - \text{Skor Pre test}}{\text{Skor Ideal} - \text{Skor Pre test}}$$

Quantitative data were collected from student learning outcomes through pre-tests and post-tests before and after using media, then statistically analyzed using the Normalized Gain (N-Gain score) test. The average results obtained after the search using the N-gain formula are then interpreted based on the N-gain level criteria to determine student learning outcomes. The criteria are ineffective [<40], less effective [40-55], quite effective [55-75], and effective [>76].

## **RESULTS AND DISCUSSION**

### **Results**

#### **Design Stages and Overview of Dorama Cards**

The Dorama Card, developed in this study, is a modified version of the conventional domino card, tailored explicitly to rice field ecosystems, thus establishing a direct connection with science learning for Grade V elementary school students. While the physical appearance of the Dorama card resembles that of a standard domino, the Dorama has been redesigned as an educational medium that presents scientific concepts such as interrelationships among living organisms, energy flow, and food chains. In contrast, traditional dominoes are typically used for recreational games, commonly known in local contexts as "*gaple*." Therefore, the Dorama card serves not merely as a game, but as a meaningful learning tool that enhances students' understanding of scientific concepts, engagingly and interactively.

#### **Stages of Analysis**

The author collected data through observation of the science learning process in class V UPTD SDN 018452 Karang Anyer, and interviews with homeroom teachers of grade V and 28 students of class V. The data collection results proved the needs and characteristics of less interested students, because science learning requires real visualization that can be observed. In addition, students have difficulty focusing and are easily bored while studying, as well as analyzing and solving problems related to food chains in rice fields.

The lack of mastery of the food chain material of the rice field ecosystem causes the learning difficulties students feel. Because students need more interesting and concrete learning media as an alternative to the science package books and learning videos that have been used, this aims to stimulate the attraction of learning with valuable experience. The analysis of the role of teachers proposes the development of learning media that aims to reduce





**Figure 3.** Dorama Cards Cover Box and Dorama Card Back Design  
*Source: Research, 2024*

The design of the images that have been modified in the science material of rice paddies is to facilitate students' understanding of the relationship between eating and eating at different levels in the food chain, which then forms complex and balanced food webs. Through the media, it is hoped that students will more easily understand how energy moves and how living things in an ecosystem depend on each other in a more tangible way, similar to nature. Third, design the back cover; the card cover follows the original domino card image to depict an easily recognizable game. Then make a card box (see **Figure 3**) measuring 9 cm x 5 cm with a paper cover designed with personal innovation and creativity.



**Figure 4.** Dorama Cards Instructions  
*Source: Research, 2024*



The finished Dorama cards are then designed to provide instructions and rules of play as a guide in the game. The guidebook in **Figure 4** is printed in a size of 8 cm x 4 cm. The Dorama card game is not only a game of entertainment in learning, but also a learning tool that invites students to understand the concept of food chains in the rice field ecosystem in an interactive and fun way. Before the game starts, each student needs to understand the flow and rules of the game so that the playing experience is both practical and educational. The game is played by four people in a group. Each game begins with shuffling all the cards. Each player will receive seven cards that are dealt randomly. The most special card in the game is the "log 6" card, which features images of soil nutrients on both sides. This card is the main, the basic, and highest element in the structure of the food chain because it is the beginning of all life processes in the rice field ecosystem. The player with this card will start the game and be the initial determinant of the game's flow.

After the "log 6" card is opened, the game continues clockwise, from the player to the first player's right. Each player must play a card capable of answering or connecting to the food chain order from the previous card. For example, if the card depicts a rice plant, the next card must represent a living thing that consumes rice, such as a grasshopper. So on, it forms a cycle of eating and eating that is based on ecological principles. The game does not always go smoothly. Sometimes, a player does not have the relevant cards to continue the sequence. In this condition, the player must declare a "pass", and it is the turn to move to the next player. If in one round all players declare a "pass" because there are no matching cards, then that is when the spirit of cooperation is tested.

The game of Dorama should not stop just because of a dead end. Instead, the players must discuss and collaborate to find a solution. They can try to rematch the remaining cards, rearrange the food chain order that might be more logical, or distribute the remaining cards evenly so that all players can participate until all the cards are played. Dorama's learning media is attractive because it teaches the importance of natural balance and interdependence between living things in an ecosystem, without feeling patronizing. Through this game, students learn the material arranged in a game in the form of cards and practice strategy, systematic thinking, and collaborative values. Thus, the Dorama card game is a tool that seeks to provide a pleasant bridge between theory and practice, between knowledge and authentic experience.

## **Development Stages**

Media creation activities are carried out at this stage according to the design stage that the media validator has revised. The Dorama card media that has been developed is then assessed for validity by experts in the field of media and learning materials using a Likert scale. The study results show that the media is very valid or suitable for use, with a validity score of 93.3% from media experts. Media expert assessments include card type selection, cover design, media usage, and background color. Several suggestions for improvement were given, such as using thick PVC cards, a cover design similar to a gable card, a booklet format for ease of storage, and a background color tailored to *the gable*/domino cards. Furthermore, in the analysis of the validity of the material, the Dorama card media obtained a score of 96%, which indicates that this media is very valid and ready to be used in the field

without the need for revision of the learning content. However, the material validator suggests that students first be introduced to the different levels of Dorama cards based on domino numbers in general, to optimize learning effectiveness.

## Stages of Implementation

At this stage, the author applies the Dorama card learning media that has been developed and revised to learn science material on the food chain of rice field ecosystems. This media was implemented in grade V students of SDN 018452 Karang Anyer, consisting of 33 students. The author carried out a pretest and a posttest to measure the improvement of students' critical thinking skills towards using Dorama card media. The results of these two tests were then analyzed using n-gain calculations, which aim to measure the improvement of students' critical thinking skills.

Before learning with Dorama cards begins, a pretest is given to get an initial idea of students' critical thinking skills. Dorama card media shows significant effectiveness. Before learning with this media, the average student's pretest score was 42.8, which indicates a less effective understanding of the material. However, after learning to use the Dorama card, the average posttest score increased to 84.4. Learning with Dorama cards enhances students' critical thinking skills by visualizing relationships within the rice field ecosystem. Students can test hypotheses and draw conclusions based on evidence by analyzing the food chain and logically arranging the cards. Dorama cards effectively bridge theory and practice, providing students a fun and meaningful learning experience. The average results obtained are interpreted based on the level of n-gain used in this study, which is presented in **Table 1**.

**Table 1.** Overall N-gain, Pretest and Posttest Results

Average Score		N-gain Score	N-gain Score (%)	Interpretation
Pre-test	Post-test			
42,8	84,4	0, 76	76%	High/Effective

*Source: Research, 2024*

Based on **Table 1**, the calculation using the N-gain score formula increased by 0.76, with a percentage of 76%. This means that there is an increase in the category of being high. From the results of the data, it can be concluded that using Dorama card media effectively improves students' critical thinking skills in class V UPTD SDN 018452 Karang Anyer.

## Evaluation Stages

At this stage, the author sees the compatibility between the learning media that have been developed and the research objectives that have been set. After the learning session was carried out using Dorama card media, the filling out of student response questionnaires for 33 grade 5 students, and questionnaires for grade V teachers' responses to learning science food chain materials using Dorama card media. Presented in **Table 2**.

**Table 2.** Evaluation of the practicality of Dorama card media

Respondents	Evaluation Aspects	Score (%)	Category
Teacher	Practicality	90,6%	Very practical
Student	Practicality	88,9%	Very practical

*Source: Research, 2024*

Based on the results of these responses in **Table 2**, it can be concluded that *Dorama* card media is efficient for improving students' critical thinking skills at UPTD SDN 018452 Karang Anyer, especially at the grade V level.

## Discussion

The study results show that using Dorama card media (Food Chain Dominoes) significantly improves students' critical thinking skills on rice field ecosystem materials. This is shown through the increase in the average score of students from the pretest of 42.8 to the posttest of 84.4, with a normalized gain (N-gain) value of 0.76, or equivalent to 76%, which is included in the high category. These findings not only indicate the success of the media in helping students understand the material's content but also demonstrate its effectiveness in stimulating critical thinking aspects of the learning process (Lubis et al., 2024). Critical thinking skills for primary education schools are essential because critical thinking includes analyzing, assessing, and inferring information based on logical and systematic evidence (Ennis, 1996).

Dorama media provides a learning stimulus that allows students to remember information and actively process it through logical matching between ecosystem elements. In line with the previous study, the process requires students to identify cause-and-effect relationships, make predictions, and assess the accuracy of the food chain arrangement shown on the cards, which is an indicator of critical thinking (Khairunnisa et al., 2024). The use of the Dorama card learning media plays a crucial role as an educational stimulus that encourages students to recall information and activates more complex cognitive processes through logical matching of elements within the ecosystem material. This process requires students to analyze cause-and-effect relationships, formulate predictions, and evaluate the accuracy of the food chain sequences presented during the activity. Learning through Dorama cards applies an experiential learning approach, where students engage in direct, contextual, and collaborative experiences. The interaction fostered during the game allows students to assist one another and exchange understanding, accelerating cognitive development through peer support. Thus, this medium enriches an enjoyable learning experience and strategically promotes the activation of critical thinking skills through meaningful and evidence-based learning processes (Anabella & Wulandari, 2024).

The validity aspect of the media also strengthens the legitimacy of the findings. Media Dorama was declared very valid based on the assessment of media experts, with a score of 93.3%, and the validity of the content by the subject matter expert was 96%. This validation includes design elements, visual clarity, and suitability of the material's content with the curriculum. Dorama cards' visual design and interactive nature effectively attract students' attention and maintain focus during the critical thinking process. Designed to align with the

learning characteristics of elementary school children, who are typically kinesthetic and visual learners, these cards foster habits of analysis and evaluation, which are central to developing critical thinking. Students learn to identify cause-and-effect relationships, test hypotheses, and conclude, which enhances conceptual understanding and problem-solving skills in other subjects. The engaging nature of the game also increases intrinsic motivation, leading to long-term academic improvement. Initial challenges, such as adapting to the rules of the game, can be mitigated with proper guidance, and this process further fosters cognitive discipline and instructional literacy. Thus, Dorama cards offer significant potential to strengthen critical thinking and contribute to overall academic success.

## **CONCLUSION**

The Dorama Card learning media, which was implemented in Grade V at UPTD SDN 018452 Asahan for the topic of food chains in rice field ecosystems, proved effective as evidenced by an increase in the average pretest score and posttest. Validation by media and content experts indicates that this media is highly feasible. Positive responses from teachers and students also confirm the practicality and acceptance of the media in the classroom. The Dorama Card increases students' learning interest through engaging, hands-on activities while bridging theoretical concepts with practice through visual and logical analysis. This creates meaningful learning experiences and fosters evidence-based critical thinking. Teachers, however, need to emphasize structured learning procedures within the educational context, ensuring that media use goes beyond mere play.

## **AUTHOR'S NOTE**

The author declares that there is no conflict of interest related to the publication of this article and emphasizes that the data and content of the article are free from plagiarism.

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