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DOMINO CARD MEDIA DEVELOPMENT TO IMPROVE CRITICAL THINKING SKILLS OF 5TH GRADE ELEMENTARY SCHOOL STUDENTS

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Abstract:
The development of innovative learning media is essential to enhance students' critical thinking skills in elementary education. This study aims to develop Domino Card learning media for fifth-grade students to improve their critical thinking skills. The research was motivated by preliminary observations at MI Mathla'ul Huda, which revealed that students' critical thinking abilities were relatively low due to the limited use of instructional media supporting higher-order thinking. The study employed a Research and Development (R&D) approach using the ADDIE model, comprising analysis, design, development, implementation, and evaluation stages. Validation results showed that the media expert awarded a score of 86%, while the material expert gave 94%, indicating high validity. The effectiveness of the media was measured through pre-test and post-test assessments. The average pre-test score was 60.37, increasing to 86.29 in the post-test. The N-gain value was 0.64 (64%), categorized as "Quite Effective." These findings indicate that the developed domino card media effectively enhances students' critical thinking skills.

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INTRODUCTION

Critical thinking has become a crucial competence in contemporary society because individuals are increasingly confronted with complex information, rapid technological change, and diverse social issues. The ability to analyze arguments, evaluate evidence, and make reasoned decisions is essential not only in academic contexts but also in everyday life (Munawwarah et al., 2020; Pristiwanti et al., 2022; Rahmadayanti et al., 2022) . Education plays a strategic role in cultivating these competencies from an early age. Law Number 20 of 2003 concerning the National Education System emphasizes the development of students' intelligence, character, and skills to prepare them for social participation. In line with this mandate, the Merdeka Curriculum initiated by Nadiem Makarim promotes competency-based and meaningful learning experiences (Hasanah, 2024; Hidayat et al., 2024). Therefore, strengthening critical thinking skills at the elementary level is a societal necessity to prepare future citizens who are rational, reflective, and responsible decision-makers.

Despite its recognized importance, the development of critical thinking skills in elementary schools remains problematic. Many students still demonstrate passive learning behaviors, rely heavily on teacher explanations, and show limited ability to analyze or evaluate information independently (Andiono, Hidayati, Syamsiyah, & Athiyah, 2025; Kurniawati, Ganda, & Mulyadiprana, 2021). In Pancasila Education subjects, for instance, students often memorize historical facts without understanding the underlying values or logical relationships between events. Classroom observations and teacher

interviews reveal that only a small proportion of fifth-grade students meet established indicators of critical thinking, such as identifying problems, formulating arguments, or providing logical justification (Hamdi, Musafa'ah, & Hasanah, 2025; Hasanah, 2025). Learning activities are often dominated by conventional methods, leading to minimal student engagement. Consequently, students' reasoning abilities are underdeveloped, indicating an urgent need for innovative instructional strategies that actively involve learners.

Previous studies have attempted to address this issue through various instructional approaches. Nirwana et al. (2024) and Hairunisa et al. (2024) found that problem-based learning can improve students' analytical skills, while Adawiyah et al. (2021) reported that collaborative learning enhances reasoning and argumentation abilities. Sumarni et al. (2020) and Shanta et al. (2022) conceptualized critical thinking indicators, including interpretation, analysis, evaluation, inference, explanation, and self-regulation. Campbell et al. (2021) emphasized the use of structured questioning strategies to foster reflective thinking. Although these studies demonstrate positive outcomes, most focus on instructional models rather than the systematic development of concrete, game-based learning media tailored for elementary students. Furthermore, research integrating critical thinking indicators directly into media design is limited, particularly in Pancasila Education contexts (McTigue, Solheim, Zimmer, & Uppstad, 2020; Nenohai, Rokhim, Agustina, & Munzil, 2022; Shields et al., 2021). This gap indicates the need for innovative media development that aligns pedagogical strategies with measurable components of critical thinking.

The novelty of this study lies in the development of domino card media specifically designed to improve critical thinking skills among fifth-grade elementary students. Unlike traditional domino games featuring numerical dots, this media integrates question-and-answer pairs structured around critical-thinking indicators, such as identifying problems, analyzing arguments, and justifying conclusions (Maimun et al., 2023; Ramdani et al., 2021). The game-based format encourages active participation, peer interaction, and reflective discussion. By embedding structured reasoning tasks within an engaging card-matching activity, the media transforms abstract concepts into interactive learning experiences (Baum, 2021; Yuan, Chen, Liu, & Ding, 2021). This state-of-the-art approach combines educational game principles with competency-based curriculum demands, making it both pedagogically relevant and practically applicable in elementary classrooms. Therefore, the development of domino card media represents an innovative solution to enhance meaningful and critical learning processes.

Based on the background described above, the research problem of this study can be formulated as follows: how can domino card media be developed to effectively improve the critical thinking skills of fifth-grade elementary school students in Pancasila Education? Specifically, this study seeks to determine the feasibility, practicality, and effectiveness of the developed media in fostering students' abilities to identify issues, define problems, analyze arguments, provide logical reasoning, and conduct self-correction. The formulation of this problem stems from the discrepancy between curriculum expectations and classroom realities, in which students' critical thinking indicators are not being met optimally. Addressing this problem is essential to ensure that instructional innovations align with educational objectives and student developmental needs.

This study argues that integrating structured critical-thinking indicators into interactive domino-card media will significantly enhance students' reasoning abilities and classroom engagement. The originality of this research lies in combining media development methodology with explicit critical-thinking frameworks, particularly in the context of Pancasila Education at the elementary level. By designing media that systematically incorporate identification, analysis, evaluation, and self-correction components, the study provides both theoretical and practical contributions. Theoretically, it enriches the discourse on game-based learning and the development of critical thinking. Practically, it offers teachers an accessible instructional tool aligned with curriculum goals. Therefore, this research contributes an innovative, context-relevant solution to strengthening critical thinking skills in primary education.

RESEARCH METHODS

This study employed a Research and Development (R&D) design to develop and validate instructional media in the form of domino cards to improve fifth-grade students' critical thinking skills (Hidayat et al., 2021). The development process adopted the ADDIE model, which consists of five systematic phases: Analysis, Design, Development, Implementation, and Evaluation. This model was selected for its structured, iterative approach, which enables continuous refinement of the product based on formative evaluation results. To examine the effectiveness of the developed media, the study applied a one-group pretest–posttest design. Students' critical thinking skills were measured before and after the implementation of the domino card media to determine the extent of learning improvement.

The study was conducted in an Islamic elementary school involving fifth-grade students during the 2024/2025 academic year. The participants consisted of 28 students selected using total sampling, as the class population was fewer than 30. In addition to the student participants, the product validation process involved one subject matter expert in Pancasila Education, one instructional media expert, and one fifth-grade classroom teacher serving as a practitioner evaluator. These experts were selected purposively based on their academic qualifications and professional experience in elementary education and instructional design to ensure the validity and feasibility of the developed product. The development of the domino card media followed the ADDIE model procedures (Indarto, Fadilah, & Anggraini, 2024):

Analysis Phase

This phase involved identifying students' learning needs, analyzing curriculum requirements under the Merdeka Curriculum framework, and examining students' characteristics and existing levels of critical thinking. Data were collected through classroom observations and teacher interviews to determine learning problems and instructional gaps.

Design Phase

At this stage, the structure of the domino card media was designed. Each card contained question–answer pairs structured according to critical thinking indicators adapted from Facione's framework, including identification, analysis, evaluation, inference, explanation, and self-regulation. Assessment instruments and validation sheets were also developed during this phase.

Development Phase

The prototype of the domino card media was produced and subjected to expert validation. Material experts evaluated content accuracy, curriculum alignment, and cognitive depth, while media experts assessed layout, visual design, clarity, and usability. Revisions were made in response to expert feedback to improve product quality.

Implementation Phase

The revised domino card media was implemented in classroom learning activities on cultural diversity material in Pancasila Education. Students participated in structured group-based domino card activities designed to stimulate discussion and analytical reasoning.

Evaluation Phase

Evaluation was conducted formatively and summatively. Formative evaluation occurred during expert validation and small-group trials, while summative evaluation examined the media's effectiveness through pretest and posttest comparisons. To provide meaning and decision-making, the following provisions were used:

Table 1. Likert Scale Scores

Score	Criteria
5	Very good
4	Good
3	Pretty good
2	Not enough
1	Very less

Table 2. Likert Scale Validity Interval

Category	Criteria
$1.00 \leq x < 2.00$	Invalid
$2.00 \leq x < 3.00$	Less Valid
$3.00 \leq x < 4.00$	Valid
$4.00 \leq x < 5.00$	Very Valid

Data Analysis Techniques

Qualitative data obtained from interviews, observations, and expert suggestions were analyzed using descriptive techniques involving data reduction, categorization, and interpretation to refine the product.

Expert Validation Analysis

The expert validation analysis of the developed media was conducted using quantitative data in the form of numerical scores obtained from the validation questionnaires completed by the experts. These scores were then systematically analyzed by calculating the average score for each item to determine the overall level of validity and feasibility of the media. The mean score for each question was calculated using the specified formula, enabling an objective interpretation of the validation results against predetermined assessment criteria. Here are the following formulas:

$$X = \frac{\sum x}{N}$$

To determine the feasibility of the media developed by the researcher, further measurement and systematic calculation procedures were carried out. After the experts completed the validation questionnaire, the scores were compiled and analyzed quantitatively. The total and average scores were then calculated using the formula below to assess the level of validity and feasibility of the developed media against the established evaluation criteria. The value is then calculated using the formula below:

$$P = \frac{\sum x}{\sum x i} x\ 100$$

To assess the feasibility of the researchers' learning media, expert validation criteria served as the primary benchmark. The results from the experts' evaluations were analyzed and interpreted against predetermined qualification standards, enabling the researchers to categorize the media's level of validity and feasibility and to determine whether revisions were necessary before implementation in the learning process. This can be seen in the following table:

Table 3. Media Eligibility Criteria

Percentage	Category
81% - 100%	Very Worthy
60% - 79%	Quite Decent
40% - 59%	Less than worthy
0% - 39%	Not feasible

The data to be analyzed are the test scores, which are the results of students' learning on cultural diversity in Indonesia using domino cards, obtained by scoring the pre-test and post-test and calculating them using the N-gain formula. The following is the N-gain formula according to Hake, as quoted by Yani Indri, Hanifah, and Triasianingrum Afrikani:

Effectiveness Analysis

Students' improvement in critical thinking skills was measured using the normalized gain (N-Gain) formula to assess learning progress between pre- and posttests. This calculation was conducted by comparing the initial and final scores to identify the effectiveness of the developed learning media in enhancing students' critical thinking abilities. The N-Gain results were then interpreted based on established gain categories to classify the level of improvement achieved. Students' improvement in critical thinking skills was measured using the normalized gain (N-Gain) formula:

$$\text{N-Gain} = \frac{Skor\ Posttes - Skor\ Pretest}{Skor\ Ideal - Skor\ Pretest}$$

Information

N-gain: The amount of increase in student ability
Pretest: Number of pre-test results
Posttest: Total post-test results

SMI : Maximum score

Table 4. N-gain Value Criteria

Mark	Category
g > 0.7	Tall
0.3 ≤ g < 0.7	Currently
< 0.3	Low

To strengthen statistical rigor, a paired-samples t-test was conducted to determine whether the difference between pretest and posttest scores was statistically significant at the 0.05 significance level. Effect size was calculated using Cohen's d to measure the magnitude of the intervention effect. The maximum value range for pre-test and post-test questions can be written as follows:

Table 5. Interpretation Categories of N-gain Effectiveness

Percentage	Category
< 40%	Ineffective
40% - 55%	Less Effective
56% - 75%	Quite Effective
> 76%	Effective

Table 5 presents the interpretation categories of N-Gain effectiveness used to classify the level of improvement in students' critical thinking skills. An N-Gain percentage of less than 40% is categorized as ineffective, 40%–55% as less effective, 56%–75% as quite effective, and above 76% as effective. These categories serve as benchmarks to determine the overall effectiveness of the developed learning media in enhancing students' learning outcomes.

Ethical Considerations

Ethical considerations were carefully observed throughout the research process. Before data collection, formal permission was obtained from the school principal and the classroom teacher to ensure institutional approval. Students' participation was voluntary, and they were appropriately informed of the study's purpose. Furthermore, the confidentiality and anonymity of all participants were strictly maintained, and the collected data were used solely for research purposes.

RESULTS AND DISCUSSION

Result

This section presents the study's findings on the development, feasibility, and effectiveness of domino card media in improving fifth-grade students' critical thinking skills in Pancasila Education. The results are organized according to the ADDIE development stages, followed by validation outcomes and statistical analysis of students' learning improvements after implementation.

Development of Domino Card Media to Improve Critical Thinking Skills in Pancasila Education Lessons

The results of the research on the development of domino card media to improve critical thinking skills will be described using the ADDIE development model, which

comprises five steps: analysis, design, development, implementation, and evaluation. The following is a breakdown of the stages according to the research results:

Analysis Stage

This analysis aims to identify and understand the problems occurring in the school and gather information about them. The stages used in this analysis include classroom observation techniques, interviews with class teachers, and documentation. Therefore, the researcher conducted field observations in class V of MI Mathla'ul Huda. In addition to observations, information and data were also obtained through interviews with class V teachers. From the results of the field observations and interviews with class teachers, the following information was obtained:

Analysis of existing problems

This analysis was conducted to identify the problems that occurred in class V MI Mathla'ul Huda related to Pancasila Education, as a reference for creating learning media on cultural diversity in Indonesia. The identified problem was that, of 27 students, only 15 were able to think critically, while the remaining 12 still experienced difficulties with critical thinking. This was due to a lack of learning media. Teachers used only the available teaching materials and media, and their implementation of learning media was limited in variety. As a result, some students found it difficult to understand the material fully and were unable to think critically.

Based on interviews conducted by researchers with grade V MI Mathla'ul Huda teachers, namely Mrs. Rani Oktaviani S.Pd., it was found that some students are still unable to think critically. This is because the learning methods used are still considered inadequate, so students are passive learners. Therefore, based on observations in the field, teachers have not used appropriate learning methods and media to convey lesson materials. Hence, they need to use these media more effectively to achieve the desired learning objectives.

Needs analysis

Based on the analysis results at MI Mathla'ul Huda, the needs of students in learning activities at school are the use of learning aids, such as learning media that can attract students' attention, especially since students at the school are happy if there are learning media used, so that it can help students to think critically and understand the subject matter. Based on these problems, the problem identified in this study is the lack of learning media for the material on cultural diversity in Indonesia. Therefore, in response to students' learning needs, researchers developed learning media in the form of domino cards to improve critical thinking skills.

Material analysis

At the material analysis stage, the selection of content was based on the identification of the Learning Outcomes (Capaian Pembelajaran/CP) for Grade V to ensure alignment with curriculum standards. The subject matter focused on cultural diversity in Indonesia, which aligns with the prescribed competencies for students at this level. The material was integrated into Pancasila Education lessons, ensuring that the developed learning media supported the achievement of relevant learning objectives and curricular requirements.

Analysis of learning objectives

The analysis of learning objectives was conducted to ensure that the use of domino cards as instructional media aligned with the intended competencies. The learning objectives were formulated as follows (Behardien, Brijlal, & Roman, 2023): (1) through the use of domino cards, students are expected to explain the cultural diversity around them accurately and comprehensively; (2) through engagement with domino cards, students are encouraged to think critically about the material related to Indonesia's cultural diversity; and (3) through domino card activities, students are guided to develop attitudes of respect, protection, and preservation toward cultural diversity. These objectives integrate cognitive and affective domains to support meaningful learning outcomes. The following are the learning objectives using domino cards as media.

Design Stage

After the analysis phase, the next step is the design phase. At this stage, researchers design or create plans for developing the learning media. The initial step in designing the media is to determine the Pancasila Education lesson on cultural diversity in Indonesia. The next steps are media selection, media design, and instrument development. At this stage, researchers design domino card learning media to improve critical thinking skills. The steps involved are as follows:

Media selection

The purpose of this media selection was to identify appropriate media that align with the characteristics of the students and the learning material. The researchers decided to use a card-based medium that would contain the learning material and several relevant images, developed as domino cards. In this regard, prior consultation with the fifth-grade teacher at MI Mathla'ul Huda was conducted regarding the development of this domino card media. According to the teacher, the developed media can serve as an additional reference for learning activities. Furthermore, this new and excellent media will likely help students understand the material and encourage critical thinking about cultural diversity in Indonesia.

Media design creation

To create the learning media design, the researchers conducted the design process online in Canva to develop domino cards and their storage box. Particular attention was given to the systematic stages of media creation to ensure that the final product aligned with the Learning Outcomes (CP) and the subject matter on cultural diversity in Indonesia. The process began by determining the appropriate application, opening Canva, and selecting an attractive domino card template. The researchers then chose suitable colors and layouts, developed questions based on the curriculum and textbooks, and created a set of 28 domino cards corresponding to the number of standard domino pieces. Each card was designed with different but interconnected questions and answers so that students could match them correctly during the game. Relevant images, such as traditional ceremonies and games, were also incorporated to support understanding and stimulate critical thinking.

Furthermore, the visual elements were carefully customized to enhance attractiveness without being overly flashy. The researchers added a red-and-white flag at the top of each card and included a batik motif on the back to reflect Indonesian cultural

identity. In addition to the cards, a storage box was designed by selecting an appropriate template in Canva. The front of the box displayed the name of the domino card media and the subject matter, while the sides were decorated with motifs to improve visual appeal. The back of the box contained relevant images and brief explanations to help students interpret their meanings. Finally, clear instructions for using the media were developed to ensure that students could properly understand and implement the domino card learning activities.

Instrument preparation

At this stage, the researcher creates product specifications before the product is developed. Afterward, the researcher develops an instrument for media assessment. Then the instrument is first validated by the lecturer, who serves as the validator. The instrument created for this media assessment will be evaluated by media experts, comprising 9 indicators across 3 assessment aspects: 3 physical, 2 material, and 4 benefit. Meanwhile, the instrument designed for material experts comprises 10 indicators across 3 assessment aspects: 3 learning aspects, 5 material aspects, and 2 language aspects. The assessment score used by the researcher is a Likert scale assessment with 5 answers, namely very good (5), good (4), quite good (3), less (2), and very less (1).

Development Stage

After completing the design stage, the next step was the media development stage. At this phase, the researchers developed the domino card learning media based on the results of the needs analysis and the previously formulated design blueprint. All planned components, including content, visual elements, and learning activities, were realized into a tangible product ready for validation and testing.

Domino card media product creation

The first stage begins with creating the front design of the domino card in Canva, which contains different questions and answers on each card.

Figure 1. Front of Domino Card

The second stage is to create a design for the back of the domino card in Canva, featuring a batik motif symbolizing the diversity of Indonesian culture. The domino cards are uploaded as PDFs for printing on art paper, each measuring 6 x 4 cm and totaling 28 cards.

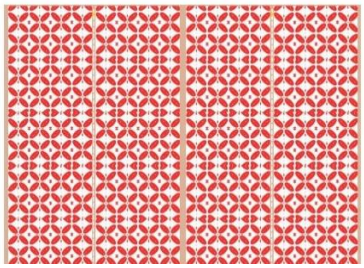


Figure 2. Back of Domino Card

The third stage is to create a design for the domino card box in the Canva application, containing the name "Domino Cards" and the title of the material, namely Cultural Diversity in Indonesia, then give a cloud batik image on the side of the box, and on the back of the box, give images of diversity. Also, an explanation of the image; after that, the box is printed to fit the size of the domino card.

Figure 3. Domino Card Box

Figure 3 shows the design of the Domino Card Box used to store the learning media. The box was created using Canva with a simple yet attractive design that reflects the theme of cultural diversity in Indonesia. The front displays the media title and subject matter, while the sides are decorated with cultural motifs. The back includes relevant images and brief explanations to support students' understanding.

Product Validity Test

The product validity test was conducted to evaluate the suitability and validity of the developed domino card media. In this process, the researchers involved both media experts and material experts to assess the quality, relevance, and appropriateness of the content and design before implementation in the learning process.

Table 6. Validity of Material Experts and Media Experts

No	Component	Validity II	Eligibility
1.	Media Expert	4.3 (very valid)	86% (very decent)
2.	Subject Matter Expert	4.7 (very valid)	94% (very decent)
Average		**4.5 (very valid)**	**90% (very decent)**

A media expert lecturer from STAI KH carried out product validation: Abdul Kabier, namely Mrs. Dirga Ayu Lestari, M.Pd. At the same time, product validation was carried out by a material expert lecturer from UIN Sultan Maulana Hasanuddin Banten, namely Mr. Oman Farhurohman, M.Pd. The media expert gave a score of 4.3 (very valid) and 86% (very feasible), while the material expert gave a score of 4.7 (very valid) and 94% (very

feasible). Overall, this media achieved an average validity of 4.5 and 90% feasibility, confirming that the Domino Card Media is very feasible to use.

Product Revision

After obtaining the results of validation by media experts and material experts regarding the domino card media that was developed, the next step is to make revisions by adjusting the responses and suggestions given by the validators regarding the domino card media that was developed, including:

Media Expert Validation

After the media expert validator provided an assessment, the researcher received feedback and suggestions. There is domino card material; add a batik motif to the back of the domino card, add the name “domino cards” on the front of the box, and repair the domino box.

Table 7. Product Revision Results from Media Expert Comments and Suggestions

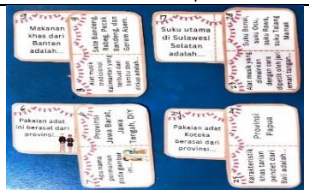
Before revision	After revision
 Still innocent	 Added motif
 Previous box model	 Box model after revision

Subject Matter Expert Validation

After the expert validator provided an assessment, the researcher received feedback and suggestions. Some domino cards needed to be adjusted to the original number, with eight more questions added due to a shortage. The diversity material on the domino cards should also accommodate the Indonesian archipelago. Regarding the missing material, material representing Indonesian islands, such as Java, is needed for dance, food, and traditional houses.

Table 8. Product Revision Results from Comments and Suggestions from Material Experts

Before revision	After revision
 20 cards	 28 cards

 Still stuck on 1 question.	 Already added
 The question is not yet representative of the island.	 The questions represent each island.

Implementation Stage

At this stage, the researcher tested the domino card media with students at MI Mathla'ul Huda Cilegon after the validator had revised and developed the media, who said the developed media was suitable for research. The researcher implemented the product directly in the learning process by administering pre- and post-test questions to 27 students to measure students' critical thinking skills after using the domino card media.

The implementation phase was conducted on April 10, 2025, and April 17, 2025. The steps of this implementation phase were based on the researcher's Teaching Module. Before the product trial, students were reminded of the material on cultural diversity in Indonesia, including regional dances, traditional clothing, traditional ceremonies, traditional games, traditional houses, traditional foods, ethnic groups, regional songs, traditional musical instruments, and attitudes of respect, maintenance, and preservation of cultural diversity. In addition, before the product was trialed, students were also given pre-test questions. After the product was trialed, students were given post-test questions to measure critical thinking skills using domino cards. The researcher implemented domino cards as a medium in Pancasila Education learning, using a material on cultural diversity in Indonesia for grade V, whose level of critical thinking skills was still low.

Evaluation Stage

This is the final stage of the ADDIE model. Researchers conduct it to determine the effectiveness of the domino cards used in the learning process. Researchers or teachers do this by completing a questionnaire. The assessment of the questionnaire aligns with the researchers' direct observation of the learning process, while the teachers serve as observers throughout. Based on the results of the questionnaire by the teacher, it was found that there were no suggestions for the domino card learning media, but the response from the teacher was very good in the questionnaire which stated that during the learning process the students looked very enthusiastic in following the learning, the use of domino card media in the learning process really made it easier for students to think critically about how to find answers to the domino card questions. From these responses, researchers can conclude that the domino card learning media is highly effective and suitable for the learning process, as evidenced by product validation results and teachers' feedback.

The Feasibility of Domino Card Media to Improve Critical Thinking Skills in Pancasila Education Lessons

The validation results of the domino card learning media were conducted by two experts: a media expert and a content expert. The following is the analysis of the Domino card media validation results:

Media Expert Validation Analysis

Product validation was conducted by a media expert lecturer from STAI KH, namely Mrs. Dirga Ayu Lestari, M.Pd. From the results of the second-stage media expert validation, 9 questions yielded a total of 43 points, with an average score of 4.3 under the "very valid" criterion. Meanwhile, the media expert's calculations assessing the product that had been made reached 86%. When compared with the validity table, the score can be considered "very feasible" or "very valid". In this calculation, the feasibility of using domino card media in the learning process is assessed. After validation using a Likert scale, the results showed that the media met the criteria of being highly suitable and received positive feedback from the validators. The following are the responses and suggestions from media experts:

Table 9. Suggestions for improvement by media experts

Media expert	Stage I improvement suggestions	Suggestions for improvement Phase II
Mrs. Dirga Ayu Lestari, M.Pd	Improve the domino card material, add batik motifs to the back of the domino cards, add the name "domino cards" to the front of the box, and repair the domino box.	Domino card media can now be tested without revision.

Material Expert Validation Analysis

A materials expert lecturer from UIN Sultan Maulana Hasanuddin Banten, Mr. Oman Farhurohman, M.Pd., conducted product validation. From the second stage of material expert validation, 10 questions were used, yielding a total of 47 points and an average score of 4.7, based on the "very valid" criteria. Based on the calculations above, carried out by media experts to assess the products made, the result was 94%. When compared with the validity table, the score can be considered "Very Feasible" or has met the criteria for "Very Valid". In this calculation, the feasibility of using domino card media in the learning process is assessed. After validation using a Likert scale, the results showed that the media met the criteria of being highly suitable and received positive feedback from the validators. The following are the responses and suggestions from the subject matter experts:

Table 10. Suggestions for improvement by material experts

Media expert	Stage I improvement suggestions	Suggestions for improvement Phase II
Mr. Oman Farhurohman, M.Pd	It would be better if the domino cards were adjusted to the original number, adding 8 more material questions, because they were still lacking. The diversity material on the domino cards should include the islands in Indonesia. Try to turn the questions that are lacking into material that represents the islands in Indonesia,	Domino card media can now be tested without revision.

	for example, the island of Java, in terms of dance, food, and traditional houses, etc.

Table 10 presents the suggestions for improvement provided by the material expert during the product validation process. In Stage I, Mr. Oman Farhurohman, M.Pd., recommended that the number of domino cards be adjusted to match the original standard by adding eight additional material-based questions, as the existing content was still insufficient. He also suggested that the cultural diversity material should better represent the major islands in Indonesia, such as including examples of traditional dances, foods, and traditional houses from Java and other regions. After these revisions were completed, in Phase II, the expert stated that the domino card media could be tested without further revision.

The Effectiveness of Domino Card Media in Improving Critical Thinking Skills in Pancasila Education Lessons

After conducting pre- and post-tests, the data were analyzed using the N-Gain test. This statistical test aims to determine whether there is a significant difference between pre-test and post-test scores, indicating the effectiveness of domino cards in improving students' critical thinking skills. The following are the results of fifth-grade students' critical thinking skills before (pre-test) and after (post-test) the application of domino cards.

Table 11. N-gain Criteria Table

Student	Pre-test	Post-test	N-gain	N-gain percentage
27	60.37	86.29	0.6498	64%

Table 12. N-gain score with SPSS

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
NGain	27	.33	1.00	.6498	.19310
Valid N (listwise)	27				

Based on the N-Gain score, the average is 0.6498, indicating "Moderate". Based on the N-Gain percentage, the average is 64%, indicating "Quite Effective". So, it can be concluded that there is a moderate increase in students' critical thinking skills before and after exposure to media, and that the use of domino card media is quite effective in improving them.

Discussion

The findings demonstrate that the development of domino card media through the ADDIE model systematically addressed the instructional problems identified in the classroom, particularly the limited use of learning media and the low level of students' critical thinking skills. The analysis stage revealed that 12 of 27 students experienced difficulty demonstrating critical thinking indicators, confirming the need for instructional innovation. This aligns with the framework of Verganti et al. (2021) and Pereira et al. (2024), which emphasizes that critical thinking must be intentionally cultivated through structured learning experiences. The integration of cultural diversity material into an

interactive domino format reflects Āboltiņa's assertion that appropriate media selection significantly influences learning quality. Thus, the present findings are consistent with prior literature suggesting that well-designed instructional media can bridge gaps between curriculum expectations and classroom realities, particularly in competency-based frameworks such as the Merdeka Curriculum.

The feasibility results further strengthen the credibility of the developed product. The second-stage validation scores from media experts (M = 4.3; 86%) and material experts (M = 4.7; 94%) indicate that the domino card media met the "very valid" and "very feasible" criteria. These results corroborate previous studies by Nirwana et al. and Hairunnisa & Abdurahman, which highlight that structured and visually engaging media enhance instructional clarity and student engagement. However, this study extends prior findings by incorporating systematic revisions informed by expert feedback, including expanding the content to include Indonesia's major islands and refining visual and cultural elements. Unlike earlier research that often focused solely on practicality, this study demonstrates a rigorous validation process that integrates content accuracy, visual design, linguistic clarity, and curriculum alignment, thereby contributing to a more comprehensive development framework (Lee, Chou, & Sung, 2021; Naseer, Khan, Tahir, Addas, & Aejaz, 2024).

Regarding effectiveness, the improvement in students' critical thinking skills is evidenced by the increase from a pre-test mean score of 60.37 to a post-test mean of 86.29, with an N-Gain score of 0.64, categorized as moderate (64%, quite effective). These findings are consistent with Adawiyah and Kowiyah's research, which indicates that domino-based learning can enhance higher-order thinking skills. Nevertheless, the moderate classification suggests that while the media significantly improves performance, it does not produce maximal gains. This differs slightly from some experimental studies reporting high effectiveness levels, which may be influenced by longer intervention durations or controlled experimental conditions (Sysoyev et al., 2023; Yavaş et al., 2021). Therefore, the present findings suggest that game-based media alone may not fully optimize critical thinking without sustained pedagogical integration and teacher facilitation strategies.

Theoretically, this study supports constructivist learning theory, which posits that knowledge is actively constructed through interaction and problem-solving. The domino card activity required students to analyze questions, evaluate possible matches, justify reasoning, and collaborate in groups, thereby activating multiple dimensions of critical thinking as conceptualized by Facione. The findings confirm that embedding critical thinking indicators directly into learning media design can operationalize abstract cognitive constructs into measurable classroom practices. Practically, the results provide teachers with an accessible, low-cost, and culturally contextualized instructional tool that promotes engagement and cognitive development simultaneously. The positive teacher responses and observed student enthusiasm indicate that such media can transform passive learning environments into interactive spaces conducive to higher-order thinking.

Despite its positive outcomes, the moderate effectiveness level indicates the need for further refinement. Factors such as limited implementation time and variability in students' initial cognitive readiness may have influenced the magnitude of improvement. Future studies should consider longer intervention periods, comparative experimental designs with control groups, and deeper analysis of individual learner characteristics. Additionally, integrating domino cards with other pedagogical strategies, such as inquiry-

based or problem-based learning, may enhance their effectiveness. Overall, the findings confirm that domino card media is valid, feasible, and moderately effective in improving fifth-grade students' critical thinking skills in Pancasila Education, while also contributing theoretically by linking structured media development with critical thinking frameworks and practically by offering a replicable model for elementary education contexts.

CONCLUSION

This study demonstrates that the systematic development of domino card media using the ADDIE model successfully addressed instructional gaps in fostering critical thinking skills among fifth-grade students. The most significant finding is that structured, game-based learning media aligned with curriculum objectives can meaningfully enhance students' analytical and evaluative abilities. The validation results from media and materials experts, categorized as "very valid" and "very appropriate," confirm that the product was developed through rigorous, accountable procedures rather than intuitive assumptions. Furthermore, the N-gain score of 0.64 (moderate category) indicates that the media effectively improved students' learning outcomes in Pancasila Education. The key lesson from this research is that interactive, culturally contextualized media can transform passive classrooms into active learning environments that promote higher-order thinking skills in elementary education settings.

From an academic perspective, this study contributes to the field of instructional design and elementary education by integrating critical thinking frameworks into media development through a validated ADDIE process. It strengthens the theoretical linkage between constructivist learning principles and practical classroom applications, particularly within Pancasila Education contexts. However, this research has limitations, including a relatively small sample size, the absence of a control group, and a limited intervention duration, which may explain why effectiveness was categorized as moderate rather than high. Future research should employ experimental designs with larger and more diverse samples, longer implementation periods, and comparative analysis with other instructional strategies to optimize impact. Further studies may also explore digital adaptations of domino-based media to enhance scalability and broader educational implementation.

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