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Development of Flashcard Media Based on Game Based Learning to Improve Mathematics Outcomes among Elementary School Students

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A B S T R A C T

Low student achievement in Mathematics at the elementary level is often associated with the use of conventional learning methods that do not optimally stimulate student engagement and conceptual understanding. Therefore, innovative learning media are needed to support more interactive and meaningful learning. This study aims to develop and test the effectiveness of Flashcard media based on Game-Based Learning (GBL) to improve mathematics learning outcomes among elementary school students. The research employed a Research and Development (R&D) method using the ADDIE model, involving two teachers and 30 second-grade students at SD Negeri Sendangmulyo, Rembang Regency. The developed Flashcards featured colorful visuals, arithmetic operations, and game-based elements to encourage active participation. Expert validation obtained an average score of 3.89 (very feasible), while practicality testing yielded scores of 3.95–4.00 (very practical). The effectiveness test showed an increase in the average student score from 49.63 (pretest) to 78.83 (posttest), with an N-Gain of 0.60 (moderate–high). These results indicate that the Flashcard media based on Game-Based Learning is valid, practical, and effective in improving students' mathematical understanding and learning motivation in accordance with the principles of the Merdeka Curriculum.

1. Introduction

Education is a conscious and planned effort to create a learning environment in which students actively develop their potential in spiritual, personal, intellectual, moral, and skill aspects required for themselves and society, as stipulated in Law Number 20 of 2003 on the National Education System. The goal of national education is to develop students' potential to become individuals who are faithful, pious, virtuous, healthy, knowledgeable, creative, independent, and responsible for social life. In line with this mandate, the government has implemented various policies to improve the quality of education in Indonesia to remain relevant to the

advancement of the era and technology. One significant policy is the development of the Independent Curriculum, which emphasizes learning flexibility and student-centered learning (Puskurjar, 2025).

The Independent Curriculum is based on the ideas of Ki Hadjar Dewantara, who argued that quality education must align with the nature of the child and aim to develop their potential holistically. The main focus of this curriculum is deep learning, which emphasizes the creation of meaningful, enjoyable, and reflective learning experiences. Deep learning integrates four dimensions of student development, namely intellectual (cognitive), ethical (emotional), aesthetic (affective), and kinesthetic (physical) into a unified whole. This approach encourages teachers to design learning activities that are conscious and participatory (Puskurjar, 2025).

In this context, Mathematics education holds a strategic position because it serves as a foundation for developing logical, systematic, and creative thinking skills. Mathematics also contributes to enhancing 21st-century competencies, particularly in problem-solving, critical thinking, and logical reasoning (Ulya & Siswanto, 2024). However, the reality in the field shows that elementary school Mathematics instruction still faces several challenges. Teachers tend to use conventional methods such as lectures, resulting in students being less active and easily losing focus. Initial observations at SD Negeri Sendangmulyo, Kecamatan Gunem, Kabupaten Rembang, revealed that more than 66% of second-grade students had not achieved mastery in the material on whole number operations, with an average score of 58.33. These conditions indicate the need for learning media that can help teachers explain abstract mathematical concepts in a concrete and engaging manner.

Media serve as tools or means to convey instructional messages from teachers to students, ensuring effective educational communication (Munthe et al., 2023). Gagne, as cited in Balkis and Rakhmawati (2019), explains that learning media are components of the learning environment capable of stimulating students to learn actively. Meanwhile, Latuheru, cited in Sari et al. (2019), states that media have an educational function because they contain educational values that help students understand learning material. The use of instructional media offers several benefits, including clarifying learning messages, increasing students' attention and motivation, overcoming sensory and spatial limitations, and fostering more meaningful learning experiences (Munthe et al., 2023). Furthermore, Kemp and Dayton, as cited in Karo and Rohani (2018), assert that media help standardize content delivery, improve time efficiency, create an engaging learning atmosphere, and transform teachers' roles into more productive learning facilitators.

One potentially effective medium is the flashcard. According to Anisa (2018), flashcards are learning media in the form of picture cards that assist children in understanding and remembering information through visualized symbols, numbers, or images. Balkis and Rakhmawati (2019) explain that flashcards can be used to introduce numerical symbols and arithmetic operations in a more visual and engaging way. Therefore, flashcards can be utilized both in the classroom and at

home as an effective and enjoyable self-learning tool for elementary school students.

To make it more engaging and meaningful, flashcards can be integrated with a Game-Based Learning (GBL) approach, which is a learning method that uses game elements to achieve educational objectives (Komang et al., 2020). Through this approach, learning activities become more interactive, competitive, and enjoyable, thereby increasing students' motivation and learning outcomes. Play is a natural means for children to explore and develop new skills (Dewi, 2022). Integrating GBL into Mathematics learning can create active, collaborative learning experiences and foster enthusiasm through game-based activities.

Learning methods are the strategies used by teachers to create enjoyable learning conditions that support the achievement of learning objectives (Yusuf et al., 2024). One relevant method for elementary school children is Game-Based Learning (GBL). According to Winatha and Setiawan (2020), GBL is an instructional approach that uses games as a medium to achieve learning goals. This method not only increases student motivation but also facilitates social interaction, collaboration, and meaningful learning experiences. Sari and Ahmad (2022) state that GBL allows students to learn through trial and error, develop critical thinking skills, and enhance persistence in completing challenges. Dewi and Listiowarno (2019) add that play in an educational context has creative and exploratory functions, allowing students to develop new skills, learn independently, and build self-confidence. Therefore, integrating flashcards into Game-Based Learning becomes an effective approach to enhance students' motivation, participation, and Mathematics learning outcomes.

Previous studies indicate that game-based media can significantly improve students' learning outcomes and engagement. Komang et al. (2020) emphasize that GBL is effective for elementary school levels because it aligns with children's developmental characteristics, which favor explorative and competitive activities. Thus, developing GBL-based flashcards represents a strategic step to support the implementation of the Independent Curriculum, which demands contextual, active, and student-oriented learning.

Based on the above discussion, this study aims to develop flashcards as a game-based learning tool for teaching whole number operations in second-grade elementary students. The research aims to describe the validity of flashcards as a Game-Based Learning medium, assess their practicality based on teacher and student responses, and examine their effectiveness in improving students' Mathematics learning outcomes.

2. Methodology

This study employed a Research and Development (R&D) approach aimed at producing a valid, practical, and effective learning product (Sugiyono, 2019; Waruwu, 2024). This approach was chosen because it aligns with the research

objective, namely to develop flashcard-based learning media utilizing Game-Based Learning (GBL) to improve elementary students' Mathematics learning outcomes. The development model used was ADDIE, developed by Reiser and Mollenda, which consists of five main stages: Analysis, Design, Development, Implementation, and Evaluation (Branch, 2016). The ADDIE model was selected due to its systematic, adaptive nature and ease of application in the development of learning media according to students' needs (Wibowo & Sutopo, 2023).

The study was conducted at SD Negeri Sendangmulyo, Kecamatan Gunem, Kabupaten Rembang, from July to September 2025. This location was chosen as it corresponds to the characteristics of the research subjects, namely second-grade students learning whole number operations. The research design employed was a one-group pretest-posttest design, in which measurements were conducted before and after the treatment to determine the improvement in students' learning outcomes after using flashcards (Creswell & Guetterman, 2019). The study began with a pretest to assess students' initial ability, followed by learning activities using flashcard-based Game-Based Learning, and concluded with a posttest to measure the improvement in learning outcomes.

The implementation of the ADDIE model began with the analysis stage, aimed at identifying students' and teachers' needs and aligning the material with the curriculum. The design stage involved creating the media design using Canva, selecting learning content, and developing research instruments. Subsequently, the development stage included the production of the initial product and validation by material and media experts. The implementation stage involved piloting the media with second-grade students at SD Negeri Sendangmulyo. The final stage, evaluation, aimed to assess the product's effectiveness and make improvements based on the trial results. This systematic approach allows for comprehensive development of media evaluated in terms of validity, practicality, and effectiveness (Branch, 2016; Waruwu, 2024).

The research subjects consisted of teachers and students of SD Negeri Sendangmulyo. During the analysis stage, two teachers served as respondents to identify learning needs. In the development stage, two experts (a media expert and a material expert) acted as product validators. During the implementation and evaluation stages, 30 second-grade students served as the media trial subjects. The subjects were selected using purposive sampling, which involves selecting samples based on their relevance to the research objectives (Sugiyono, 2019).

The instruments used in this study included observation sheets, validation questionnaires, learning outcome tests, and teacher and student response questionnaires. Observation sheets were used to monitor the learning process and media requirements, while validation questionnaires were provided to media and material experts to assess product feasibility (Wibowo & Sutopo, 2023). Learning outcome tests, including pretests and posttests, were used to determine the effectiveness of the media in improving students' learning outcomes (Creswell & Guetterman, 2019). Teacher and student response questionnaires assessed the practicality and acceptance of the learning media. All questionnaires employed a

Likert scale with four categories: very good (4), good (3), adequate (2), and poor (1) (Riduwan & Akdon, 2018).

Data collection techniques included observation, expert validation, learning outcome tests, and questionnaires. Observation was used to identify learning media needs, expert validation to assess product feasibility, tests to determine learning improvement, and questionnaires to evaluate media practicality. Data validity was reinforced through triangulation, combining various data sources to enhance research accuracy (Creswell & Guetterman, 2019). The collected data were analyzed using qualitative and quantitative approaches. Qualitative analysis was employed to interpret the results of observations and open-ended questionnaires, while quantitative analysis processed validation, practicality, and effectiveness data. Quantitative analysis involved calculating average scores and feasibility percentages using the formula: $P = \Sigma x / N \times 100\%$.

The effectiveness of the media was categorized as follows: scores above 76% were considered effective, 56–75% moderately effective, 40–55% less effective, and below 40% ineffective. Learning improvement was analyzed using the N-Gain test to determine the increase in pretest and posttest scores (Hake, 1998), with categories of high (≥ 0.70), medium ($0.30 \leq g < 0.70$), and low (< 0.30). Additionally, a paired sample t-test was conducted to examine significant differences between learning outcomes before and after using the media. If the p-value < 0.05, there is a significant difference, indicating that flashcards are effective for Mathematics learning (Sugiyono, 2019; Creswell & Guetterman, 2019).

3. Results and Discussion

This study aimed to develop and examine the effectiveness of Flashcard-based learning media utilizing Game-Based Learning (GBL) to improve Mathematics learning outcomes for second-grade students at SD Negeri Sendangmulyo in the 2025/2026 academic year. The development model employed was ADDIE (Analysis, Design, Development, Implementation, Evaluation). The research results include the stages of product development and field trials, covering aspects of validity, practicality, and media effectiveness.

Analysis Phase

The analysis stage aimed to identify learning needs and problems faced by teachers and students in Mathematics lessons. Observations showed that students' learning outcomes were still low, with an average daily assessment score of 58.33 and a mastery level of only 33.33%. The instructional approach used by teachers generally relied on lecture and drill methods with simple and limited media, such as fingers and concrete objects. Students also demonstrated low motivation and tended to be passive during learning activities. Interviews with teachers indicated the need for more innovative learning media that could encourage student participation and engagement through educational play. A summary of the identified learning conditions and needs is presented in Table 1.

Table 1. Initial Student Needs Analysis

Analyzed Aspect	Observation Findings	Learning Implications
Average daily test score	58.33	Below KKM 70
Student mastery	33.33%	Requires innovative learning media
Teacher's teaching method	Lecture and conventional exercises	Limited student activity
Student response	Passive and easily bored	Needs educational play activities
Media used	Fingers and simple concrete objects	Unattractive and less interactive

Based on the results presented in Table 1, it can be seen that the low level of mastery learning and limited student engagement were strongly influenced by the lack of interactive and visually appealing learning media. Traditional lecture-based instruction did not provide sufficient stimulation for young learners, who generally require concrete illustrations and engaging activities. Consequently, students tended to become passive and easily bored, which negatively affected their Mathematics performance. These findings confirmed the urgency of introducing learning media that are more engaging and capable of supporting active student involvement. Therefore, Flashcard-based Game-Based Learning media were considered an appropriate solution to address these learning barriers and improve classroom interaction.

Design Phase

The design phase was carried out to translate the results of the needs analysis into a concrete learning media concept that aligns with the cognitive development and learning characteristics of second-grade students. At this stage, decisions were made regarding the visual appearance, content structure, and interactive format of the Flashcard media. The researcher focused on creating media that were simple, clear, and attractive to support students' visual and kinesthetic learning needs. The Flashcards were designed in a size suitable for small hands, using bright colors and child-friendly illustrations to stimulate students' interest in learning. In addition, the dotted-line numbers were purposefully included to allow students to practice number recognition while developing early writing skills. The full specifications of the designed media are presented in Table 2 below.

Table 2. Flashcard-Based Game Media Design Specification

Component	Description
Media type	Interactive flashcards + educational game board
Content	Whole number operations (addition and subtraction)
Card design	Canva, 7.5 x 10.5 cm, colorful and illustrated
Game application	Magic Number Adventure Snakes and Ladders
Learning function	Training number recognition, arithmetic operations, and story problems
Advantages	Interactive, attractive, easy to use, and durable

Based on the specifications shown in Table 2, the developed media integrate visual learning, play-based learning, and guided practice to create a more meaningful

Mathematics learning atmosphere. The colorful illustrations and clear symbolic representations help students understand concepts more concretely, while the game board encourages social interaction and collaboration among peers. Furthermore, the simplicity of the Flashcard layout ensures that the material can be accessed and understood by students at varying readiness levels. The combination of Flashcards and the board game also supports repetitive and engaging practice, making the learning experience more enjoyable and less monotonous. Overall, the design phase successfully produced learning media that are developmentally appropriate, pedagogically relevant, and aligned with the principles of student-centered learning.

Development Phase

In the development phase, the Flashcards were produced based on the previously established design specifications and adapted to the developmental characteristics of early-grade students. The media consisted of three types of Flashcards, namely: (1) picture–number cards designed to strengthen number recognition, (2) arithmetic operation and comparison symbol cards to support computational readiness, and (3) simple story problem cards to encourage contextual reasoning. Additionally, the educational game board "Magic Number Adventure Snakes and Ladders" was developed to integrate the Flashcards into an interactive learning activity, reinforcing whole number operations through collaborative gameplay. This combination allows the media to function not only as a visual learning tool but also as an engaging game platform that promotes peer interaction, hand–eye coordination, and active participation. The learning process supported by this media aligns with the concrete-to-abstract conceptual transition required in early mathematics learning. The visual appearance of the developed Flashcards is presented in Figure 1.

(a) (b) (c)

Figure 1. Sample Flashcards Developed (a) Picture–Number Cards, (b) Arithmetic and Comparison Symbol Cards, (c) Simple Story Problem Cards

Figure 2. "Magic Number Adventure Snakes and Ladders" Game Board

To ensure feasibility prior to implementation, the product underwent expert validation by a media expert and a material expert. The validation assessed aspects of content accuracy, language clarity, presentation quality, and visual design. The results indicated that the Flashcard-based Game-Based Learning media were highly feasible, with an average score of 3.9, and only required minor revisions such as improving text contrast and adjusting the background color. These revisions were minimal and did not change the substance of the media, making the product ready for classroom field trials. The detailed validation results are shown in Table 3.

Table 3. Expert Validation Results

Assessment Aspect	Average Score	Category
Content feasibility	3.85	Very Feasible
Language	3.90	Very Feasible
Presentation	3.80	Feasible

The results in Table 3 indicate that the Flashcard-based GBL media achieved a high level of feasibility based on expert evaluation. The material was considered accurate and appropriate for second-grade students, while the language used was clear and easy to understand. The presentation aspect was also rated feasible, with only minor adjustments needed, particularly regarding text contrast and visual clarity. Overall, the media met the standards for classroom use and was deemed suitable to proceed to the implementation stage.

Implementation Phase

The implementation phase aimed to determine the practicality and usability of the Flashcard-based Game-Based Learning media when applied in real classroom conditions. During this phase, the teacher first introduced the Flashcards and explained the rules of the educational board game to ensure students understood the learning procedure. Students were then divided into small groups, where they took turns using the Flashcards while participating in the game. Throughout the activity, the teacher facilitated learning, provided reinforcement, and monitored student engagement. Observations focused on how well the media supported lesson delivery, student interaction, and the achievement of learning objectives. Additionally, practicality questionnaires were administered to both the teacher and the students to obtain more comprehensive feedback. The results are presented in Table 4.

Table 4. Media Practicality Test Results

Respondent	Assessment Aspect	Average Score	Category
Teacher	Alignment with objectives, ease of use, implementation effectiveness	4.00	Very Practical
Student	Interest, active participation, ease of understanding material	3.95	Very Practical
Learning Observation	Implementation of GBL syntax and student participation	3.90	Very Good

The practicality results shown in Table 3 indicate that the Flashcard-based GBL media were well-received and effectively supported the teaching and learning process. The teacher's score of 4.00 suggests that the media were easy to integrate into classroom activities and aligned with the learning objectives. The student response score of 3.95 shows that the media successfully increased student engagement, interest, and confidence in learning Mathematics. Furthermore, the learning observation score of 3.90 reflects that the implementation of the game-based approach encouraged active participation and collaboration among students. These findings confirm that the media not only functioned as an instructional aid but also contributed to creating an enjoyable and interactive learning environment, making it highly practical for use in early elementary Mathematics instruction.

Evaluation Phase

The evaluation phase aimed to measure the effectiveness of the Flashcard-based Game-Based Learning media in improving students' Mathematics learning outcomes. To achieve this, a pretest was administered before the intervention to determine students' initial understanding of whole number operations. The media were then implemented over a series of learning sessions, after which a posttest was conducted using equivalent test items. The comparison of pretest and posttest results allowed the researcher to identify the extent of learning improvement. Furthermore, the N-Gain score was calculated to determine the effectiveness level, and a paired t-test was performed to examine the statistical significance of the differences. The results of the effectiveness evaluation are presented in Table 5.

Table 5. Flashcard Media Effectiveness Test Results

Test Type	Average Score	Difference	Category
Pretest	49.63	-	-
Posttest	78.83	+29.20	Effective
N-Gain	0.60	-	Medium–High
Paired t-test (Sig. 2-tailed)	0.000	< 0.05	Significant

The results presented in Table 5 indicate a substantial improvement in students' mathematical performance following the implementation of the Flashcard-based GBL media. The increase of 29.20 points from pretest to posttest demonstrates that students were better able to understand and apply whole number operations after participating in the learning activities. The N-Gain value of 0.60, categorized as medium–high, shows that the media effectively enhanced learning outcomes for most students. Additionally, the significance value of 0.000 from the paired t-test confirms that the improvement was not due to chance, but rather a direct result of the learning intervention. Overall, these findings verify that the Flashcard-based GBL media are effective tools for supporting conceptual understanding and increasing student achievement in Mathematics.

The results demonstrate that Flashcard-based Game-Based Learning media developed through the ADDIE model are valid, practical, and effective. The media not only assist students in visually understanding mathematical concepts but also enhance motivation and active engagement. By combining game elements with

learning, students can learn while playing in a fun and competitive environment. The implementation of this media aligns with the principles of active and student-centered learning in the Independent Curriculum, making it highly relevant for elementary school application.

Discussion

The results of this study indicate that the development of Flashcard-based learning media utilizing Game-Based Learning (GBL) is proven to be valid, practical, and effective in enhancing elementary students' Mathematics learning outcomes. This success can be analyzed through three main aspects: product validity, practicality of use, and media effectiveness in improving learning outcomes.

Validation results show that the Flashcard-based GBL media obtained an average score of 3.89, categorized as very feasible. This finding indicates that the developed media met the criteria for content quality, visual appearance, and pedagogical appropriateness. The media combine appealing visual elements with educational game activities, which serve to strengthen the concrete understanding of basic Mathematics concepts. High validity aligns with Branch (2016), who argued that the quality of learning products is determined by the alignment between content, design, and students' needs. The ADDIE development model allows continuous evaluation at each stage, enabling the product to be adapted to actual learning requirements (Wibowo & Sutopo, 2023). In this context, Flashcard-based GBL integrates visual, kinesthetic, and collaborative approaches suitable for elementary school students' learning styles. Moreover, these findings support Nugroho and Budiyono (2023), who stated that visual media such as flashcards can enhance students' cognitive abilities in recognizing symbols, numbers, and basic numerical concepts. With simple yet colorful designs, students can better understand abstract Mathematics concepts, consistent with Bruner's theory of representational learning, which asserts that elementary students learn more effectively through visual and manipulative representations.

The practicality aspect showed that the Flashcard-based GBL media received scores ranging from 3.95 to 4.00 from teachers and students, categorized as very practical. Teachers assessed the media as easy to use and compatible with the Independent Curriculum's student-centered learning flow. Students found learning more enjoyable, competitive, and interactive. This finding confirms Munthe et al. (2023), who stated that effective learning media not only deliver information but also motivate students to participate actively. The integration of flashcards with Game-Based Learning enables students to learn by playing, which has been proven to improve knowledge retention and learning interest (Sari & Ahmad, 2022). Practically, the media help teachers create a collaborative and non-monotonous learning environment. This is consistent with Winatha and Setiawan (2020), who found that GBL application in foundational learning increases students' activity and collaboration, as they are directly engaged in problem-solving through educational games. Thus, the practicality of Flashcard-based GBL lies in its ability to shift the teacher's role into a facilitator, while students become active subjects learning

through exploration and social interaction, aligning with the constructivist learning paradigm underlying the Independent Curriculum (Yusuf et al., 2024).

Effectiveness testing showed a significant increase in students' learning outcomes, from an average pretest score of 49.63 to a posttest score of 78.83, with an N-Gain of 0.60 (medium–high category). The paired-sample t-test yielded a p-value = 0.000 < 0.05, indicating that the use of Flashcard-based GBL media significantly impacted the improvement of elementary students' Mathematics learning outcomes. These findings support Hake (1998), who emphasized that interactive media and active engagement activities enhance conceptual understanding and knowledge transfer. In the context of basic Mathematics, students' involvement in flashcard-based educational games promotes meaningful and active learning, as they do not merely memorize but also comprehend concepts contextually.

Moreover, these findings align with Oktafyani et al. (2022), who found that the use of number cards in learning activities increases students' interest and computational skills. Indriani et al. (2022) also demonstrated that visual game-based media could raise learning mastery to 95%. Therefore, Flashcard-based GBL media are proven effective in helping students understand whole-number operations in a more enjoyable and meaningful way. Media effectiveness is further supported by Gagne in Balkis and Rakhmawati (2019), who stated that learning is more effective when it involves visual stimuli, physical activity, and social interaction. Flashcard-based GBL meets all three criteria, as students not only receive information passively but also engage in playing while thinking critically to solve simple mathematical problems.

The Independent Curriculum emphasizes student-centered, contextual, collaborative, and project-based learning. The use of Flashcard-based GBL directly supports these four characteristics. Through game activities, students are trained to think critically, collaborate, and solve problems in an enjoyable context. According to Sari et al. (2019), 21st-century learning should encourage higher-order thinking skills, one of which can be developed through active learning media. By learning through play, students practice reasoning, decision-making, and reinforcing mathematical concepts via social interaction. Furthermore, integrating game elements in learning has been shown to enhance students' intrinsic motivation. Dewi and Listiowarno (2019) noted that Game-Based Learning creates a creative and low-pressure learning environment, motivating students to explore knowledge independently. This explains why learning outcomes significantly improved after students engaged with Flashcard-based GBL media.

Overall, this study demonstrates that the development of Flashcard-based Game-Based Learning media meets the three primary criteria of educational media development: validity, practicality, and effectiveness, as outlined by Borg & Gall in Waruwu (2024). (1) Validity. The media have content and appearance suitable for elementary students. (2) Practicality. The media are easy to use, engaging, and motivate active student learning. (3) Effectiveness. The media have been proven to significantly improve Mathematics learning outcomes. Therefore, Flashcard-based Game-Based Learning media are not only instructional tools but also an active

learning strategy aligned with the vision of 21st-century education, aiming to develop students who are critical thinkers, collaborative, and problem-solving oriented.

4. Conclusion

This study produced Flashcard-based learning media utilizing Game-Based Learning (GBL) that are valid, practical, and effective in enhancing elementary students' Mathematics learning outcomes on the topic of whole-number operations. Based on validation results from media and content experts, the developed product obtained an average score of 3.89, categorized as very feasible, indicating that the content, appearance, and language of the media align with the characteristics of lower-grade students. Practicality tests showed that the media were easy for teachers to use and enjoyable for students, with average scores ranging from 3.95 to 4.00, categorized as very practical.

Furthermore, effectiveness tests demonstrated a significant improvement in students' learning outcomes, from a pretest average of 49.63 to a posttest average of 78.83, with an N-Gain of 0.60 (medium–high category) and a p-value < 0.05. This indicates that the use of Flashcard-based Game-Based Learning can enhance students' understanding of operational concepts while fostering motivation and enthusiasm for learning. Therefore, the developed media function not only as a visual aid but also as an innovative, active, and enjoyable learning tool consistent with the principles of the Independent Curriculum.

Theoretically, this study reinforces the view that the use of visual media and game-based approaches can improve student engagement, interaction, and learning outcomes. Practically, teachers can utilize Flashcard-based GBL media as an alternative innovative, student-centered teaching strategy. Further research is recommended to develop similar media for different topics and educational levels and to integrate interactive digital elements to optimize effectiveness in the 21st-century learning era.

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