Volume 6 Number 1 (2026)
January-June 2026
Page: 113-129

E-ISSN: 2797-0965
P-ISSN: 2809-9710
DOI: 10.37680/basica.v6i1.9357

BASICA Journal of Primary Education

Development of Picture Card Media for Science Learning at Elementary School

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Submitted: 01/01/2026 Revised: 20/01/2026 Accepted: 20/02/2026 Published: 25/03/2026

Abstract

This study aims to determine the development of card media (picture cards) in science learning for Grade III students in MIN 6 Medan city. This research is a Research and Development (R&D) research with the ADDIE development model, namely analysis, design, development, implementation, and evaluation. The subject of this study is a class III student at MIN 6 Medan city. The research instruments are in the form of questionnaires/questionnaires, test instruments, student response instruments, and teacher response instruments. The collected data were analyzed descriptively using percentage techniques. The results showed that: (1) picture card media for animal food chain material was successfully developed; (2) the validity test results showed a score of 73% from the material expert, categorized as valid, 85% from the media expert, categorized as very valid, and 100% from the practitioner/teacher, categorized as very valid; and (3) the practicality test results showed 99% in the initial trial, 95% in the field trial, and 91% based on the teacher's response, all categorized as very practical. Therefore, the developed picture card media are feasible for use in science learning for Grade III elementary school students. This study was limited to the development, validity, and practicality of the media and did not directly measure improvement in students' learning outcomes.

Keywords

Development, Cards (Picture Cards), Food Chains in Animals.

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INTRODUCTION

To prepare students to play an appropriate role in various environments in the future, education is a conscious effort by families, communities, and the government through guidance, teaching, and training activities that take place at school and beyond. lifelong schooling (Casmana et al., 2023; Malin, 2021; Theoharis, 2024). Education serves to build skills, a superior national character, and a civilization that makes the people of a country intelligent (Fajriati et al., 2022; Hasibuan et al., 2023; Hasibuan & Rahmawati, 2022, 2019). The process of imparting knowledge, skills, and attitudes to a group of individuals through teaching or training under the supervision of others is called education and is essential to humans.

The science learning process in Grade III of MIN 6 Medan City has not yet been carried out optimally. Interviews and observations showed that teaching still depends largely on lectures and written explanations, while the media used in class are limited and less engaging for students. This condition affects students' participation and understanding, especially in learning the concept of animal food chains. The student needs analysis also showed that most students responded less positively to science learning, and more students preferred game-based media than the media commonly used by the teacher. These findings indicate a clear instructional problem and highlight the need for more interactive and student-centered learning media. Therefore, the development of picture card media was considered relevant to address this need in science learning

In the 2013 Curriculum, learning media play an important role in education. Everything that can be used to channel messages to arouse students' interest and encourage their thoughts, feelings, and attention to achieve learning goals is called learning media. For elementary school students, who are generally between the ages of 7 and 12, learning media is very important because at that age they enter the concrete operational stage, characterized by their ability to reason logically, whether it is concrete or abstract (Masrifa et al., 2023). Therefore, learning media must facilitate students' understanding of the material learned. Good media must be tailored to students' needs, taking into account their psychological, philosophical, and sociological characteristics.

Science is one subject that requires media to make the teaching and learning process meaningful (Höttecke & Allchin, 2020). The term "natural science" (IPA) refers to the scientific study of nature. Science is not only the mastery of a set of information expressed in the form of facts and concepts, but it is also a process of discovery (Nur'ariyani et al., 2023; Samsudin et al., 2023). Science is the study of natural events using observations and experiments conducted by humans. Learning

science is very important, especially because science teaches children how to think critically and impartially (Gandolfi, 2021). One way to make science learning a success is to use resources that spark students' interest and passion for the subject, making it more fun and relevant to them. Student-centered learning should take precedence in science education. For students to gain greater awareness of nature, they must actively participate in their education (Abdullah et al., 2025; Pratiwi, 2021).

The findings of MIN 6 Medan City show that the learning process is still not optimal. Students are less engaged, and learning is not optimal because classroom teaching still relies heavily on lectures, and learning resources are limited to writing. Only after the class is finished is the image media pasted on a large piece of cardboard. Written subject explanations are written on colored paper, and the media is pasted or hung on the classroom wall. The text on the paper is less visible from the back, and the image medium used is quite clear. Students need more creative learning materials to raise teaching standards and achieve learning objectives. Learning media can increase students' enthusiasm for learning, deepen their understanding of the material, and increase their active participation in the learning process.

This inspired him to conduct a study by creating more inventive and charming media. Card game-based learning materials are considered innovative. One creative way to improve science teaching in the classroom is to integrate game elements into media production. In this case, media innovation targets elementary school education, especially to foster an interesting, creative, interactive, successful, and fun learning environment. The research "Development of Pokari Pokabu Media (Pop-Up Magic Card and Plant Grouping) in Grade III Elementary / MI Students" provides evidence of this. Her research findings show that creating Pokari Pokabu (Pop-Ups and Magic Cards for Grouping Plants) media improves students' understanding of science-related topics, increases student engagement, and makes learning more fun. The findings of this study are "valid" because card game media can improve students' understanding of concepts and provide learning objectives.

Based on the above explanation, further studies are needed to facilitate students' understanding and help them understand the importance of learning. To engage students and make learning relevant, a variety of learning materials are used, each with a unique design that sets it apart. The creation of card-based learning materials, or "Karran" (card-based learning). Students can take advantage of card-based learning resources to learn while playing, making the learning process more fun and stimulating the spirit of learning.

This approach helps students comprehend lessons, develop thinking skills, foster creativity, and achieve learning goals. The research titled "Development of Card Media to Improve Science Learning Outcomes of Grade III Students of MIN 6 Medan City" addresses the issues and needs outlined above.

METHOD

This research uses a research and development (R&D) methodology to design, develop, and validate learning media. The process follows the ADDIE framework, which includes five stages: analysis, design, development, implementation, and evaluation. The ADDIE framework was selected for its systematic approach and widespread application in creating learning media and instructional materials, such as worksheets, modules, and textbooks (Dick & Carey, 1978). The analysis stage identifies specific learning challenges and needs. Performance analysis reveals that students have a limited understanding of food chains in rice paddy, desert, and marine ecosystems, and show low motivation to engage with the teaching materials. Student analysis assesses learners' characteristics, cognitive skills, and comprehension, especially regarding critical and creative thinking. Material analysis aligns learning content with essential competencies and relevant learning indicators.

The design stage conceptualizes learning media based on the analysis. Product design entails developing an initial version of game cards illustrated with plants and animals. Content centers on learning objectives for food chains, while the rules ensure clear instructions for effective use. The evaluation instrument is a questionnaire given to media experts, content experts, classroom teachers, and students. In the development stage, the conceptual design becomes a tangible product. The learning media are picture cards measuring 9 × 6 cm, featuring plants and animals from rice fields, grasslands, deserts, and marine ecosystems, arranged in food chain order. Directional symbol cards help students organize food chain sequences. An A4-sized guidebook supports instruction by detailing rules for group formation, card distribution, gameplay, and activity repetition as directed by the teacher.

The implementation stage involves product testing. The initial one-on-one trial with two grade III students from MIN 6 Medan City, who had different abilities, assessed the product's feasibility. Revisions followed based on their feedback. Subsequent field trials included 20 grade III students with varied learning profiles. Student response questionnaires captured feedback and evaluated the

media's suitability. The evaluation stage measures the effectiveness and feasibility of the learning media. Data from validation sheets, teacher assessments, and student response questionnaires inform final revisions and confirm classroom suitability (Cahyadi, 2019).

FINDINGS AND DISCUSSION

Findings

The findings of this study are presented in accordance with the ADDIE model's stages: analysis, design, development, implementation, and evaluation. The presentation in this section focuses on the research results and empirical data obtained during the process of developing picture card media for the animal food chain material in grade III of MIN 6 Medan City.

Analysis

The analysis phase involved interviews and observations at MIN 6 Medan City. Teachers from the third grade were interviewed on May 9, 2023. Observations took place on June 15, 2023, and from October 9 to November 4, 2023. Interview results showed that many third-grade students disliked science, especially the topic of the animal food chain. The teacher explained that students struggled to understand and retain the concept of the food chain. Their daily test scores for this topic were also lower than for other science topics.

The results of the student needs questionnaire supported these findings. Of 20 students, 14 responded less positively to science learning. The remaining six responded positively, with varying levels of approval. Data on the media teachers have used so far shows that 10 students stated that teachers use videos more often, 7 stated that teachers use pictures, 3 stated that teachers use real objects, and no students stated that teachers use games as learning media.

In contrast, media-preference data showed that 13 of 20 students preferred games, 5 preferred videos, 2 preferred images, and none preferred real objects. This data indicates that game-based media is more appealing to students than the media currently used in learning. The material analysis was conducted with reference to the 2013 Curriculum in Core Competency 5.1, which identifies various types of "eating and being eaten" and "symbiosis" (food chains) interactions that commonly occur in living organisms. Based on this analysis, the material developed includes the definition of the food chain, the actors in the process of eating and being eaten, the classification of living things by level, and the sequential arrangement of animal food chains. The findings from the analysis stage indicate that the development of picture card media is needed to support a more engaging, interactive, and appropriate learning experience for grade III students.

Design

The design phase focused on developing the product design, game rules, and assessment instruments. The product was designed as picture cards measuring 6.3 x 8.8 cm, with the playing card size serving as the basic component. The designed media components consist of playing cards, animal pictures, and arrow cards. The animal pictures align with the food chain material, while the arrow cards show the direction of the eating-and-being-eaten relationship.

Table 4.1. Card Media Completeness

No.	Product Design Components	Amount
1.	Playing cards	2 boxes
2.	Animal pictures	25 images
3.	Arrow card	9 images

In addition to product design, researchers also developed game rules. Students were divided into groups of five to six. Each group received a random picture card and an arrow card. They then constructed a food chain according to the teacher's instructions, such as a rice field, ocean, or desert food chain. The group with the most correct and fastest results was declared the winner.

At this stage, a product assessment instrument outline and an assessment questionnaire were also developed for students, teachers, media experts, and subject matter experts, both in checklist form. These instruments were used to assess the feasibility and practicality of the developed media. Findings from the design stage indicated that the media were systematically designed across product components, game mechanics, and assessment instruments.

At this stage, the researchers developed the rules for the picture card game as part of the learning product design. The rules essentially follow those of card games in general, though some adjustments were made to align with the learning objectives. The purpose of developing these rules was to make it easier for teachers and students to understand the game flow, ensuring that activities can proceed in a focused, orderly, and effective manner.

Before the game begins, the teacher instructs students to form groups of five to six people. Once the groups are formed, the teacher distributes picture cards to each group. The cards are then shuffled so that the pictures each group receives are not sequential. The teacher also randomly distributes cue cards, which are direction cards. After all groups have received their picture cards and cue cards, students await the teacher's further instructions before the game begins.

During the game, the teacher instructs each group on the type of food chain they must construct based on the provided images. For example, the teacher might ask students to construct a

food chain in a rice field ecosystem. In this game, students must work quickly, carefully, and collaboratively to arrange the images according to the correct food chain concept. The game is not timed. The first group to correctly construct the food chain is declared the winner. During the game, each group is not allowed to view the work of other groups to ensure the game is conducted fairly and independently. All group members must also work together effectively to complete the assigned task. Once one group completes the task, the other group is considered to have completed that round. The game can then be repeated according to the teacher's instructions for food chains in rice fields, marine, and desert ecosystems.

In addition to designing the rules for the picture card game, the researchers also developed a product assessment instrument at this stage. This activity began with the creation of an outline for a product assessment instrument and an assessment questionnaire for students, teachers, media experts, and material experts. The instrument was prepared as a checklist to facilitate data entry and analysis. The product assessment instrument outline serves as a guideline for validating student responses and verifying the opinions of practitioners, media experts, and material experts regarding the product under development. The instrument outline is presented in more detail in Appendices 4, 5, 6, and 7, while a complete description of the prepared questionnaire is also available in the appendix.

Development

The development phase resulted in a media product consisting of 128 animal picture cards measuring 6.3 x 8.8 cm and arrow cards to indicate the relationship between eating and being eaten. The development process involved selecting animal images relevant to the material, editing and adjusting the image size, printing, cutting, and pasting the images onto playing cards. The arrow cards were also designed and printed according to media requirements.

Figure 2.1 development of picture card design

Picture cards are the main component in the card media (picture cards) which are made from ordinary playing cards and pasted with pictures of various animals that have been prepared by researchers. And the picture cards are made as many as 128 cards, each card has been pasted with various pictures of animals according to the needs of the material, and each card is the same size, namely 6.3 x 8.8 cm. Then the arrow picture card functions to complete the card media component where the arrow picture card is useful to indicate which direction the animal eats and is eaten.

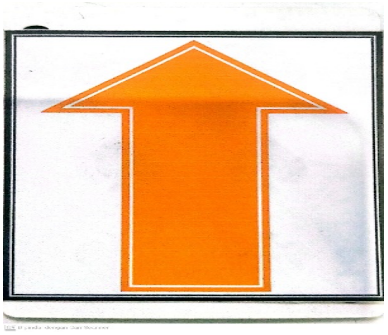

Figure 2.2. Development of Arrow Image Card Design

The development results were further validated by material and media experts. The material validation was conducted by Ms. Aufa, M.Pd.I., a lecturer at the PGMI FITK UIN Sumatera Utara, using a five-level Likert scale questionnaire containing 17 assessment indicators. Validation was conducted on October 11, 2023. The validation results showed a total score of 62 with a validity percentage of 73% and a valid category. Media validation was conducted by Ms. Andina Halimsyah Rambe, M.Pd., a lecturer at the PGMI FITK UIN North Sumatra. The assessment included 19 indicators covering product engineering and visual communication aspects. The validation results showed an overall score of 80, with a validity percentage of 85%, categorized as very valid.

Table 4.2. Summary of Validation Results by Subject Matter Experts

No	Aspect	Mark				
		5	4	3	2	1
1.	Suitability of material with basic competencies	√				
2.	Suitability of material with indicators	√				
3.	Suitability of material to learning objectives		√			
4.	Student interactivity with media		√			
5.	Accuracy of material coverage		√			
6.	Meaningfulness of material		√			
7.	Suitability of material to level student development		√			
8.	Appropriateness of language use to level student development			√		
9.	Ease of learning to understand		√			

10.	Completeness of the scope of questions			√
11.	Conformity of material sequence			√
12.	Quality of presentation of material			√
13.	Current material			√
14.	Material truth			√
15.	The attractiveness of material packaging		√	
16.	Sequence of presentation of questions			√
17.	The significance of media in supporting science learning on the material of food chains in animals			√
Amount		**1 0**	**2 8**	**2 4**
Total number		**6 2**		
Validity Percentage		**73 %**		
Category		**Valid**		

Table 4.2 shows that although indication 10 gets a score of 3, indicators 2, 3, 5, 6, 8, 11, 12, 13, 14, 15, and 16 get a score of 4, and indicators 1, 4, 7, 9, and 17 get a score of 5. Obtaining a percentage of 73% and a validity level of "valid" without changes based on computational findings. Therefore, cards or graphic cards are suitable for use as learning tools. To ensure the materials are suitable for use in field trials, subject matter experts provided advice and feedback during material development. Expert opinions and recommendations on the following topics are provided.

Table 4.3. Summary of Validation Results by Media Experts

No	**Aspect**	**Mark**				
Product Engineering Aspects		**5**	**4**	**3**	**2**	**1**
1	Clarity of media usage instructions (game instructions)			√		
2	Suitability of media to student characteristics		√			
3	Ease of use of media	√				
4	Media safety for students		√			
5	The significance of media in supporting learning material on Indonesian cultural diversity		√			
6	Easy to carry anywhere (*portable*)	√				
7	Media use can increase learning activities	√				
8	The use of media can create healthy competition among students		√			
9	Media can be used independently		√			

Amount				
Visual Communication Aspects				
10	Suitability of typeface to level student development		√	
11	Appropriate font size when used in groups		√	
12	Readability of writing when used properly Group		√	
13	Accuracy of color composition		√	
14	*Layout* accuracy	√		
15	Appropriate use of images with objects concerned	√		
16	Media display quality		√	
17	Suitability of media size when used in groups		√	
18	Media packaging quality		√	
19	Media resilience		√	
Total number		**2**	**5**	**3**
			2	
Total number		**8 0**		
Validity Percentage		**8 5 %**		
Category		**Very Valid**		

Table 4.8 shows that indications number 2, 4, 6, 7, 8, 9, 10, 12, 14, 15, 16, and 19 obtained a score of 4, while indicators number 3, 5, 11, 13, 17 and 18 obtained a score of 5. The percentage is 85% with a validity assessment of "very valid" without adjustments based on computational findings. Therefore, in terms of product engineering and visual communication, the card media (picture cards) on the food chain material are suitable for use as learning media. Input from media experts included improvements to card color and image selection, improvements to the card surface through lamination for greater durability, and improvements to media usage instructions. Findings from the development phase indicated that the developed media met valid and highly valid criteria, and specific input was provided for product refinement prior to pilot testing.

Implementation

The implementation phase was conducted through initial group trials and field trials on third-grade students at MIN 6 Medan City. The initial group trial was conducted on November 24, 2023, involving two students with varying ability levels. The results of the initial group trial showed a total score of 99 out of a maximum score of 100, resulting in a 99% practicality percentage,

categorized as very practical. A field trial was conducted on December 2, 2023, involving 20 students divided into four study groups. The field trial results showed a total score of 950 out of a maximum score of 1,000, resulting in a practicality percentage of 95%, categorized as very practical. In addition to student data, a third-grade teacher at MIN 6 Medan City also assessed the use of media. The teacher questionnaire showed a score of 29 out of a maximum of 32, with a practicality percentage of 91%, categorized as very practical.

Table 4.3. Summary of Media Implementation Results

Subject/Trial	Number of Respondents	Score Obtained	Percentage	Category
Initial group trial	2 students	99/100	99%	Very practical
Field trials	20 students	950/1000	95%	Very practical
Teacher's response	1 teacher	29/32	91%	Very practical

The results of the assessment recapitulation at the implementation stage are as follows.

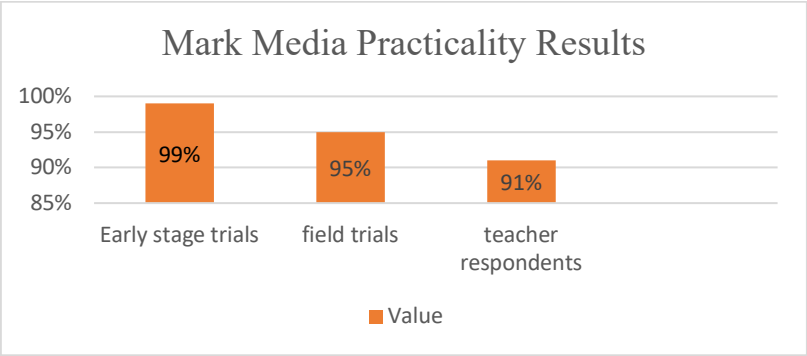

Diagram 2.1. Media Practicality Results

The usefulness of the media cards or picture cards is shown in diagram 4.3. The results in the initial trial stage were 99%; in contrast, the results of the field trial were 95%, and the results of the percentage of teacher respondents were 91%. A third-grade teacher at MIN 6 Medan City evaluated the card media (picture cards) during a field test with students. Appendix 19 shows the findings of the practitioner's evaluation of the card media or picture cards. As seen in Appendix 19 in Table 6, which summarizes the results of the trial conducted by practitioners, signs 1 to 35 were given a score of 5. The percentage achieved was 100% with a validity level of "very valid" without revision based on the criteria. calculation findings.

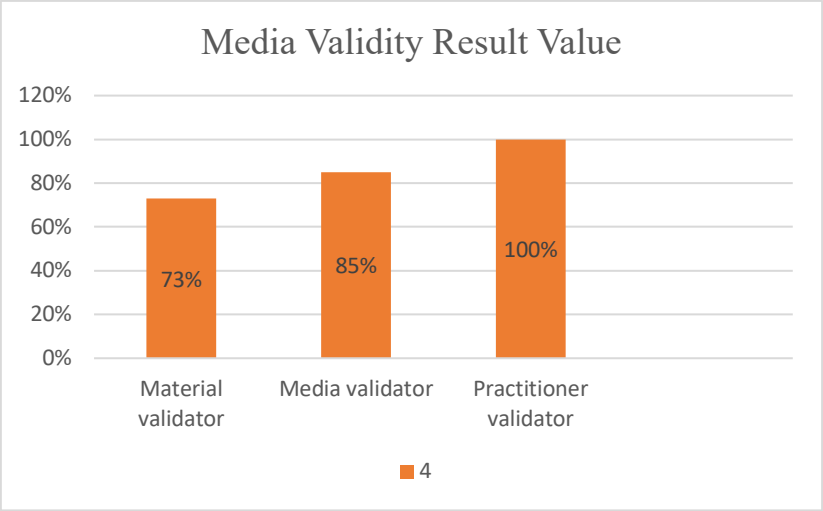

Diagram 4.4. Media Validity Results

The validity results on the card media (picture cards) show that the practitioner expert validator (class teacher) obtained a percentage result of 100% while the media expert validator obtained a result of 85%. The result from the material/content expert validator was 73%.

Evaluation

The evaluation phase was conducted to assess the final feasibility of the product based on validation and trial results. The evaluation involved material experts, media experts, and third-grade practitioners/teachers.

Table 4.4. Summary of Final Media Evaluation Results

Aspect	Data source	Percentage	Category
Validity	Subject matter expert	73%	Valid
Validity	Media expert	85%	Very valid
Validity	Practitioner/teacher	100%	Very valid
Practicality	Initial group trial	99%	Very practical
Practicality	Field trials	95%	Very practical
Practicality	Teacher's response	91%	Very practical

The evaluation results by practitioners showed that all assessment indicators received a score of 5, resulting in a validity percentage of 100%, categorized as very valid. This complements previous validation findings, with 73% from subject matter experts and 85% from media experts. Overall, the evaluation results indicate that the picture cards have a high level of validity and practicality. This finding is supported by the validity percentages from material experts, media experts, and practitioners, as well as the practicality results from the initial group trial, field trial, and teacher

responses.

Discussion

The development of card media (picture cards) for food chain materials is carried out using the ADDIE model proposed by Dick and Carey 1996, which comprises five stages: analysis, design, development, implementation, and evaluation (Surur, 2021). However, in this study, the researcher limited the development process to the implementation stage. The selection of the ADDIE model is based on its characteristics: simple, systematic, and easy to apply in the development of learning media. The final product of this study is in the form of card media (picture cards) designed to support science learning in elementary schools. The problems identified by researchers in science learning in grade III MIN 6 Medan City serve as the main basis for developing this media. The lack of engaging learning media and students' low interest in science lessons results in the learning process not occurring optimally. Therefore, innovative learning media are needed to increase students' interest, involvement, and motivation in learning science concepts, especially those related to the food chain.

The high validity and practicality of the developed picture card media indicate that the product is not only acceptable in terms of content and design, but also functional in classroom use. This may be explained by the nature of the media itself, which transforms the abstract concept of animal food chains into concrete visual sequences that are easier for Grade III students to observe and arrange. For elementary school learners, especially those who still rely heavily on concrete representations, visual and manipulative media help simplify conceptual understanding and reduce dependence on verbal explanation alone (Agustina et al., 2024). Therefore, the picture card format supports science learning because it makes relationships among living things more visible, structured, and meaningful for students.

The media developed for the card are student-centered and emphasize active learning. In the trial stage, teachers serve as facilitators and companions, while students are directly involved in the learning process through educational games. During the trial, students showed high enthusiasm and involvement, corroborating view that late childhood is a developmental phase characterized by a strong interest in fun play and learning activities (Wahyuni & Azizah, 2020). Based on validation by material and media experts, the product developed is declared suitable for use. This aligns with the opinion of Azzahra Kamila Cahyani Masdar et al. (2024), who stated that learning media is appropriate when it aligns with the learning objectives. Validation by material experts

showed that the card media met the criteria for material suitability, including Basic Competencies, indicators, and learning objectives. Aspects of student interaction with the media, the meaning of the material, and ease of understanding received high scores, indicating that the media effectively support the learning process.

These findings also align with Faiga Olifia Dg. Mangawe et al. (2025) view that the suitability of learning media is determined by interactivity, contextuality, actuality, ease of understanding, systematics, and the material's meaning. In addition, the food chain materials presented in the media have met the criteria of accuracy, completeness, order, and content consistency, as shown by the material expert's validation score. The media's suitability to the characteristics of elementary school students is also one of its advantages. Mulyadin (2024) explained that elementary school-age children tend to like playing, moving, and working in groups. Game-based card media, when used in groups, have been proven to increase student interest and participation. This is supported by validation results showing high scores in material suitability, student development, and communicative language use.

From the perspectives of media engineering and visual communication, card media meet the criteria of effectiveness, ease of use, portability, and safety for students. This media is also considered easy to maintain, reusable, and flexible for use both inside and outside class hours. Media expert validation showed high scores for ease of use, security, and the role of media in improving student learning activities. Aspects of visual communication, such as layout, color, size, typography, and illustration, also enhance the effectiveness of the media. The selection of bright colors is considered appropriate for elementary school students and can increase interest in learning, in line with Fatimah & Maryani (2018) view on the importance of color and visual design in children's learning media. In addition, the font size, text readability, and the quality of the illustrations were judged appropriate for group use.

The trial results showed that the use of picture card media fostered students' enthusiasm, active participation, and learning motivation during science learning activities. Students appeared happy and actively engaged throughout the learning process. However, the trial also indicated that the use of this media was more effective when implemented in small groups, because interaction and learning time could be managed more efficiently. Overall, the validation results showed high feasibility, namely 100% from the practitioner/teacher, 73% from the material expert, and 85% from

the media expert. In addition, both teacher and student responses placed the media in the very practical category. These findings indicate that picture card media are feasible and practical for use as a science learning medium in elementary schools.

CONCLUSION

Based on the results of this research and development study, it can be concluded that the objective of this study, namely to develop picture card media for teaching animal food chain material to Grade III students at MIN 6 Medan City, was successfully achieved. The media were developed through the ADDIE model, which includes the stages of analysis, design, development, implementation, and evaluation. The final product consists of educational game-based learning media in the form of playing cards containing pictures of animals and arrow cards that indicate feeding relationships in the food chain. The findings of this study show that the developed picture card media are feasible for use in science learning. The validation results indicated that the media were categorized as very valid by the media expert and learning practitioner, and valid by the material expert. In addition, the practicality results showed that the media received very positive responses from both students and the teacher and were categorized as very practical. These findings mean that the picture card media are not only appropriate in terms of content and design, but also easy to use, attractive, and supportive of classroom learning activities.

This study contributes to the development of innovative learning media for elementary science education, especially for food chain material. The picture card media provide an alternative instructional medium that is more interactive and suitable for the characteristics of young learners. The use of visual and game-based elements can help students participate more actively in the learning process and make abstract science concepts easier to understand. Therefore, this study contributes both theoretically, by enriching research on learning media development, and practically, by providing teachers with a feasible instructional medium for classroom use.

However, this study has several limitations. First, the research was conducted only in one school, namely MIN 6 Medan City, and involved a limited number of Grade III students. Second, the developed media were limited to one science topic, namely the animal food chain. Third, this study mainly focused on the validity and practicality of the media, so its effectiveness in significantly improving students' science learning outcomes was not examined in depth. Therefore, future research is recommended to test the effectiveness of picture card media on a larger scale, involving

more schools and participants. Further studies may also develop similar media for other science topics and examine their impact on students' learning outcomes, motivation, and classroom engagement. In this way, the use of picture card media can be further improved and expanded in elementary school learning.

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