JPPIPA 10(10) (2024)

Jurnal Penelitian Pendidikan IPA

Journal of Research in Science Education

http://jppipa.unram.ac.id/index.php/jppipa/index

Development of Domino Card Media in IPAS to Improve Learning Outcomes Students of SD Negeri Patemon 02 Gunung Pati District, Semarang City

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Received: April 12, 2024
Revised: June 19, 2024
Accepted: October 25, 2024
Published: October 31, 2024

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DOI: 10.29303/jppipa.v10i10.7373

Abstract: One of the most important elements in educational activities is the learning media. But in practice, only a few teachers are able to take advantage of the learning media that exist today, this has an impact on student learning outcomes. Therefore, the purpose of this study was to develop domino cards as a learning media teaching science in elementary schools. This research uses the Research and Development method with the model used. namely *Borg and Gall*. This study involved teachers and 20 students in grade V of SD Negeri Patemon 02. Domino learning media was designed to meet the needs of teachers and students through documentation, interviews, observations, and questionnaires. The study results show the percentage of level of eligibility of domino card media by material and media experts with a percentage of 95% and 93% respectively with very feasible criteria. The pretest and posttest results show that domino card learning media improves student learning outcomes, with an n-gain value of 0.55 and moderate criteria. This shows that domino card learning media is effective for improving student learning outcomes science learning outcomes in learning grade V students of SD Negeri Patemon 02 human respiratory system material.

Keywords: Dominoes; Elementary school; IPAS; Learning media; Learning outcomes

Introduction

Education is a very important need for human life, through education humans can develop existing potentials to be in accordance with the values that exist in society. Education is the main foundation in producing and improving quality human resources (Sihaloho et al., 2023). Education is useful for increasing human knowledge and abilities. Human potential can be maximized through high-quality education, namely by developing the potential of the nation's next generation as a whole in all fields-physical, intellectual, emotional, social, and spiritual. The current century is an era of globalization that demands high-level thinking skills (Makhrus, 2018). This is reinforced by opinions Destiniar (2018) In facing the challenges of the times, education is one way to prepare the nation's next generation.

Law No. 20/2003 Chapter I Article 1 states that education is a conscious and directed effort to create learning conditions and learning mechanisms so that students seriously build their abilities to have intelligence, noble morals, self-control, personality, and independence. This is in line with the law. Every education graduate is required to have competence in three aspects, namely attitudes, knowledge, and skills (Asma et al., 2020). Active and fun learning can realize successful and optimal learning, this requires the role of human beings with character and quality, which is the goal of national education (Nurudin, 2023). The main means of advancing a country is through education. To

How to Cite:
Anabella, Y., & Wulandari, D. (2024). Development of Domino Card Media in IPAS to Improve Learning Outcomes Students of SD Negeri Patemon 02 Gunung Pati District, Semarang City. *Jurnal Penelitian Pendidikan IPA*, *10*(10), 7361–7372. https://doi.org/10.29303/jppipa.v10i10.7373

retain qualified graduates, a country must be able to ensure a high standard of education (Akareem & Hossain, 2016). The life of the nation will be influenced by education. The standard of living of the Indonesian nation will increase along with the increasing level of Indonesian education. According to Ramlah (2022) that if learning is carried out effectively-that is, if learning can be organized and conducted in a way that suits the learning objectives that have been set out in the curriculum then the quality of education will be achieved.

Problems that are often encountered in an education are an influence in order to educate the life of the Indonesian nation in order to be able to create a good and quality next generation of the nation. Student learning outcomes are caused by many aspects, in this case learning requires creative teachers (Suratno et al., 2023). This is in line with opinion Gumanti (2018) factors that affect student learning outcomes are internal and external factors. This is reinforced by opinions Utami et al. (2015) internal factors such as physical and motivational. While external factors such as teachers and learning media. If learning in the classroom only uses a model, it is incomplete (Andayani, 2020). This is the reason why when learning takes place in the classroom, the right learning media must be used. A pleasant, meaningful, dynamic, and dialogical educational atmosphere is needed by educators and education staff, in accordance with Article 40 paragraph 2 of the National Education System Law Number 20 of 2003. This is in line with opinion (Pramono et al., 2021) that teachers are responsible for creating a classroom atmosphere that inspires students. In order not to fall behind in teaching, teachers must have strong competence (Yulyani et al., 2020). Therefore, teachers must determine and develop learning media that can increase student learning outcomes.

To achieve the intended learning outcomes, the use of instructional media is crucial to the learning process. It is anticipated that the use of learning media will enhance learning results (Taufiq et al., 2014). Atiaturrahmaniah et al. (2020) that media is one of the aspects that make learning interesting and fun. According to Manasikana et al. (2022) everything that educators use in delivering messages that encourage learning and help students understand learning abilities is referred to as a learning medium. While according to Wahyu et al. (2020) in order to get the desired results, learning media serves as a communication tool between educators and students.

Learning media not only accelerates the learning process but also has the ability to make abstract concepts concrete. Learning media helps students in learning (Alika & Radia, 2021). In addition, students can receive information effectively through the use of learning media (Puspita Sari & Setiawan, 2018). In the learning process, teachers generally deliver material to students is abstract. Teachers can use learning media to make the material taught to students realistic and in accordance with their daily experiences, so that the material taught is not abstract (Khumaeroh et al., 2021). Erfan et al. (2020) effective learning media can attract students' interest and motivate them to learn. Junaidi (2019) said that the application of learning media can arouse attention and enthusiasm in learning.

One of the learning media that is close to everyday life is dominoes. Muthoharoh et al. (2020) states that domino learning media is a modification of dominoes that have two parts, namely the right and left segments. Questions are asked in one section, while answers are provided in the next. In domino learning materials, questions and answers are on separate cards. Khumaeroh et al. (2021) states that dominoes are bounded by a center line consisting of a left segment and a right segment, each of which has a different round point. Domino media is a card-shaped media with questions at the top and answers at the bottom. The cards are attractively packaged with pictures related to the subject matter taught (Insani et al., 2023). Domino media can be played by two or more people. According to Setiawan et al. (2020), to attract students' attention, learning media such as dominoes can be used. Dominoes have several advantages: they are fun, practical, easy to use, and easy to memorize. The drawback, dominoes are easily torn and have size and number limitations, making them less effective for large amounts. Dalle et al. (2018) students are motivated to win the game before playing the domino card game.

Using domino learning media, students may learn while playing. According to Rastegarpour et al. (2012) playing while learning helps students understand abstract and fun concepts, they can also benefit from the experience of playing with peers while learning. Learning while playing is a fun activity that is educational (Veronica, 2018). Games are fun activities as well as a way of learning for students (Suprayitno et al., 2023). Playing while learning is a practical way that children like (Maulida, 2020). Students can benefit from a play-by-learning experience with their classmates by using game-based learning to help them understand abstract and fun subjects. Learning while playing is useful for training students' brains and mentality (Sitepu, 2018). This is reinforced by opinions Rohmah (2016) with games played by children in elementary school will trigger their brain and mental development. Application of domino learning materials in the form of games for four or more players, with a set of dominoes containing twenty-eight cards that are dealt equally to the players (Manasikana et al., 2022). Students are

responsible for actively seeking and collecting related questions and answers. The purpose of the application of dominoes is to support students in remembering the material that has been presented.

One of the primary school subjects that covers the environment and its surroundings is Natural and Social Sciences (IPAS) (Istyasiwi et al., 2021). IPAS learns about the environment so it requires concrete objects in learning (Chan, 2017). IPAS teaches students to discover and do in order to gain a deep understanding of their environment. Students must have a scientific mindset and ability (Rahmadita et al., 2021). IPAS also provides opportunities for students to gain new experiences (Studhalter et al., 2021). The curriculum sets the direction of education in terms of its implementation (Rahmatsyah & Dwiningsih, 2021). Science and social studies are taught separately in the 2013 Curriculum, but in the Merdeka Curriculum, science and social studies are integrated to form IPAS. Learning using IPAS must be student-centered and prioritize independent hands-on experience (Dewi et al., 2017). In science learning, learning media is essential to maintain the flow of learning and help students understand the lesson (Insani et al., 2023), by using the concept of learning while playing, domino card media can help science learning (Istyasiwi et al., 2021). The brain abilities of students can be greatly stimulated by domino card games because they require focus, attention, precision, concentration, and knowledge. In addition, domino card media can also increase cohesion and train cooperation between students. The selection of the right learning media can add to the quality of learning so as to make students understand the material provided by the teacher. This is reinforced by opinions (Strohmer & Mischo, 2016) teacher ability affects the quality of education, which impacts on how students learn. Therefore, to achieve learning objectives, educators must strive to implement a creative, inventive, efficient, and fun learning process.

Based on observations made by researchers in grade V SD Negeri Patemon 02 found several problems in learning. The problem encountered is that the learning media used is still limited to using learning videos and the minimal use of concrete media. In addition, limited school facilities and infrastructure in supporting classroom learning such as projectors and speakers used to display learning videos. The results of interviews conducted by researchers with homeroom teachers show that the learning resources used by teachers in the classroom learning still use LKS. In social studies learning in class, students tend to be less focused on learning and do not listening to the teacher when delivering learning. The condition of these different students becomes a different problem for each student so that it affects student learning outcomes. Therefore, to help students better understand the lessons they are taught, teachers must provide the appropriate learning media. This is supported by documentation data obtained from exam scores of grade V students of SD Negeri Patemon 02 in the Science Subject which focuses in semester one on the midterm summative assessment of the 2023/2024 school year, learning outcomes that have inequality from the highest and lowest grades. The highest midterm summative assessment result was 98 and the lowest was 26. So it can be decided that the learning outcomes of class V science SDN Patemon 02 are said to be low.

Some researchers have conducted research on the development of domino card media for students in elementary schools that have research similarities with researchers. Some evidence of research conducted by Muthoharoh et al. (2020) proved that students learning motivation level was 39% before and 76% after, it can be concluded that dominoes are a viable learning tool to use in the educational process and can increase students' desire to learn in grade IV. Research conducted by Khumaeroh et al. (2021) demonstrate that 94% of students who used domino card media to learn actively received an average score of 4.7. Meanwhile, the research conducted by Nurudin, (2023) as demonstrated by the results obtained of 0.82 with high criterion.. Therefore, a more in-depth analysis needs to be conducted regarding the creation of domino card media for students in elementary school while considering the requirements of teachers and students.

Domino card media encourages students to learn while playing, so the use of domino cards can increase student participation in the classroom. Using domino card media will make children not bored, and the information conveyed is easily understood by them. To ensure that teaching and learning goes according to plan, students are also more involved and interested in what they learn.

Based on the problems that have been explained, the researcher interested in research and development (R&D) with the title "Development of Domino Card Media in Science Subjects to Improve Learning Outcomes Students of SD Negeri Patemon 02 Gunung Pati District, Semarang City".

Method

In this study, researchers used a quantitative approach. Mukhid (2021) states that quantitative research is research that uses data in the form of quantitative numbers. The research method carried out by the researcher is the type of research and development or *Research and Development (R&D)*. According to Sugiyono (2016) to create and assess the feasibility of the product, research and development methods are used. The development model of this

research is the *Borg and Gall* model. The product referred to in this study is domino card learning media. in science subjects of human respiratory system material. According to Sugiyono (2016) the research and development steps have ten stages whose application must be carried out sequentially. However, researchers carried out the development of this media to the eighth stage, namely trial use. This is because researchers have limitations in terms of time and cost to be able to mass produce media. Thus, researchers only conduct research with these 8 steps: Potential and problems, Data collection, Product design, Design validation, Design revision, Product trial, Product revision, Trial use, are the steps used in this study.

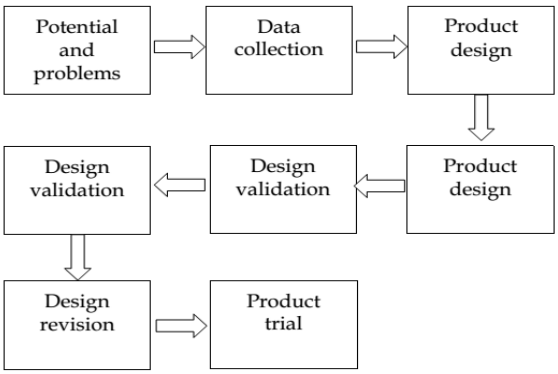

Figure 1. Borg and Gall research and development steps

This research was conducted in Kela V SD Negeri Patemon 02, Semarang City with a study population, namely grade V students of SDN Patemon 02 with a population of 20 students and a sample of 6 students. The sampling technique in this study used *purposive sampling* techniques consisting of students with low, medium, and high abilities. This research was conducted in two stages, namely a small-scale trial involving 6 grade V students as test subjects and a large-scale trial involving 20 grade V students of SDN Patemon 02. This study used observation, interviews, questionnaires, and documentation as data collection techniques. Observations were made through observations during the science learning process in class V SDN Patemon 02. The interview was conducted to collect information about science learning in the classroom through the opinions of grade V teachers of SDN Patemon 02. The questionnaire used to collect data in this study, it took the form of a questionnaire of the need to obtain information related to the research conducted and a questionnaire of domino media user responses given to teachers and students consisting of a number of written statements related to the domino card media used, besides that there was also a questionnaire used in product feasibility testing in the form of an assessment sheet given to two experts, i.e. material and media experts.

The data received comes from evaluating the appropriateness of the media created, student responses to the media, and student learning outcomes after learning to use domino card media. Analysis of media feasibility from evaluations carried out by material and media experts, scoring analysis of teacher and student response questionnaires, and analysis *of student pretest* and *posttest* results are techniques used in the analysis of this research data. Tables 1, 2, 3, 4, and 5 below show the research questionnaire criteria.

Analysis of Media Feasibility Questionnaires

The data analysis technique used in the media feasibility questionnaire uses the Likert scale with a rating scale of 1-4. Answers on the Likert scale are made with the highest score of 4 "very good", 3 "good enough", 2 "good", and the lowest score 1 "less good". The assessment of the percentage of media feasibility can be calculated using the following equation 1.

$$Percentage = \frac{total\ score\ obtained}{maxium\ score} x100\% \quad (1)$$

Table 1. Eligibility Criteria for Domino Learning Media

Percentage	Criterion
86-100	Very decent
71-85	Proper
56-70	Pretty decent
41-55	Less viable
25-40	Not worth it

Questionnaire Analysis of Teacher and Student Responses

The data analysis technique used in the response questionnaire is the Guttman scale. The answer "Yes" gets the largest score of 1 on the Guttman scale, while the answer "No" gets the lowest score at 0.

Table 2. Eligibility Criteria for Domino Learning Media

Percentage	Criterion
91-100	Very decent
81-90	Proper
71-80	Pretty decent
61-70	Less viable
10- 60	Not worth it

Analysis of Student Learning Outcomes

The normality test, t-test, n-gain test are used to calculate students learning outcomes after learning using domino cards. Here are the test criteria for normality test, t-test, and n-gain test.

Table 3. Normality Test Criteria

Result	Information
L.Calculate < L.Table	H0 accepted
L. Calculate > L.Table	H0 rejected

Table 4. T Test Criteria

Result	Information
P-Value < 0.05	There is a significant difference
P-Value > 0.05	There is no significant difference

The following equation 2 can be used to calculate the percentage of n-gain test assessment.

$$N - Gain = \frac{posttest\ score - pretest\ score}{maximun\ score - pretest\ score} \quad (2)$$

Table 5. N-Gain Test Testing Criteria

N-Gain Value	Category
g > 0.7	Tall
0.3 ≤ g ≤ 0.7	Keep
g < 0.3	Low

Result and Discussion

The result developed through this research is domino card learning media for learning Natural and Social Sciences (IPAS) material of the human respiratory system in grade V SD Negeri Patemon 02. The title of the product developed by the researcher is "DOMISIPA" (Domino of the Human Respiratory System". Potential and problems, Data collection, Product design, Design validation, Design revision, Product trial, Product revision, Usage trial, Product revision, and Mass production Potential and issues, Data gathering, Product design, Design validation, Design revision, Product trial, Product revision, Usage trial, Product revision, and Mass production are the ten processes that make up the Borg and Gall research and development approach. However, due to time and cost constraints, researchers only arrived at the eighth step with the following stage details:

Potential and Problems

At this stage, researchers identify potential and problems in the field through observation, interviews, and documentation activities at SD Negeri Patemon 02, Gunung Pati District, Semarang City. Researchers conduct analysis in various aspects ranging from the curriculum used, available facilities and infrastructure, learning models used, availability of learning media, learning media used, implementation of science learning by teachers, and student learning outcomes. The potential and problems that researchers found based on observations and interviews in class V of SDN Patemon 02 in science learning that the learning media used is still limited to using learning videos and the minimal use of concrete media so that the use of learning media is less efective. School facilities and infrastructure are still limited in supporting classroom learning such as projectors and speakers used to display learning media in the form of learning videos. In addition, the learning resources used by teachers in classroom learning still use LKS. Student success in learning is also influenced by the completeness of learning facilities (Ramdani et al., 2020). This is also supported by documentation data obtained from the exam scores of grade V students of SD Negeri Patemon 02 in the Science subject in the midterm summative assessment for the 2023/2024 school year, namely as many as 11 (55%) students scored below KKTP while 9 (45%) other students scored above KKTP. Student learning outcomes can be caused by many things, including lack of student participation in the learning process and teacher inability to create learning media. Although each student's condition is different, the right learning media is needed to improve student learning outcomes. Learning media can affect student learning motivation (Cahyadi, 2019).

Data Collection

After the discovery of potential and problems, further collect data. At this stage, Researchers analyzed the media needs questionnaires to determine the needs of teachers and students. The purpose of this needs questionnaire is to determine the needs of teachers and students for the development of media that will be developed by researchers. This questionnaire will also be used as a reference in the product design process to support the implementation of learning. Teachers are one of the factors that can create the next generation (Sharples & Kelley, 2015). Researchers gave a questionnaire of needs to teachers and grade V students of SDN Patemon 02 and found that teachers have used learning media in science learning in class, but these media are not always used in the learning process. Teachers need additional learning media to deliver material on the human respiratory system. One very important educational innovation is the development of learning media (Daryanes et al., 2023). Both teachers and students agree that there should be new media to assist in studying the components of the human respiratory system. In addition, teachers have never used domino learning media in science learning in class. Therefore, researchers try to provide solutions to existing problems by developing domino learning media in science subjects material of the human respiratory system.

Product Design

The next step is to design the product after the researcher has the information needed to make domino learning media on the human respiratory system material for grade V SDN Patemon 02. At this stage, researchers make domino learning media based on human respiratory system material. Domino learning media is different from dominoes that are commonly used as a game. Learning media designed by researchers is a media used for learning, it's just shaped like

dominoes. The domino card media that the researchers developed was designed using the Canva application with a length of 5.5 cm and a width of 9 cm and printed using 360 gsm ivory paper. The front and back of dominoes are given a colored background and equipped with images that match the learning material, namely the human respiratory system. A set of dominoes consists of 25 cards with 4 different colors namely red, orange, yellow, and blue. The words "*Start*" and "*Finish*" is used as the opening and closing cards, on the first and last cards, respectively.

Researchers made dominoes with two sections of the same size, question cards were in the lower segments, while answer cards were in the upper segments. This is reinforced by opinions Nirwana et al. (2023) that domino learning media consists of some questions asked at the bottom and others at the top. Like dominoes in general, domino learning media is equipped with a domino card box measuring 7 x 9 cm and a guidebook containing guidelines for the use of domino card media and human respiratory system material contained in dominoes measuring 10 x 13 cm. A guidebook is a book that provides direction and information to the reader on how to carry out the tasks he or she describes. This is reinforced by opinions Savitri et al. (2018) a guidebook is a book that leads the reader to know something completely. Analytical considerations regarding data collection gave rise to design for developing this learning media stage through teacher needs questionnaires where dominoes are designed with attractive colors and adjusted to the character of students. Figure 2 shows the results of designing domino card learning media regarding the human respiratory system.

Figure 2. Domino card media product design

Design Validation

After designing the product, researcher validates the domino card learning media design. Design validation is carried out by a team of experts which includes material and media experts. The stage aims to determine whether the product design created by the researcher is suitable for development. The assessment criteria of the two experts are very feasible, feasible, quite feasible, less feasible, and not feasible. The criteria for assessing media eligibility from material and media experts can be seen in table 1.

The recapitulation of material expert assessments shows that the domino card learning media has an assessment percentage of 95% with the criteria "Very Appropriate" based on three assessment aspects, namely suitability of the material, suitability of the content, and competence. Table 6 presents the findings of material expert analysis regarding the feasibility of domino card media.

Table 6. Results of Domino Media Feasibility Assessment by Material Experts

Assessment Aspect	Percentage	Criterion
Aspects of material suitability	96.77	Very decent
Content feasibility aspect	100	Very decent
Competency aspect	91.67	Very decent
Sum	95	Very decent

After the material expert assesses the feasibility of domino card learning media, the media expert assesses the domino card media. The results of the recapitulation of the media expert's assessment showed that the domino card learning media reached 93% with the criteria of "Very Feasible" based on three aspects: appearance, presentation, and use. Table 7 shows the results of the analysis of the assessment of the feasibility of domino card media by material experts.

Table 7. Results of Media Feasibility Assessment by Media Experts

Assessment Aspect	Percentage	Criterion
Display aspect	93.75	Very decent
Presentation aspect	95	Very decent
Wearing aspect	91.67	Very decent
Sum	93	Very decent

Based on the result of the evaluation that has been carried out, the domino card learning media developed is very feasible to be tested as a learning medium in science subjects in elementary schools based on input and advice from material and media experts.

Product Design Revision

After knowing the media suitability assessment by material and media experts, there are inputs and suggestions given as improvements to domino card media. Media dominoes that have been given input and advice by material and media experts at the previous

stage are then corrected by researchers. Where material and media experts provide advice on guidebooks to be printed with sturdy materials and appropriate sizes, the addition of more detailed instructions for use, and the addition of images that match the material to attract student learning interest and so that the guidebook is durable to use. Figure 3 show the results of the product design revision.

(a) (b)

Figure 3. The results of the product design, (a) Before revision, (b) After revision .

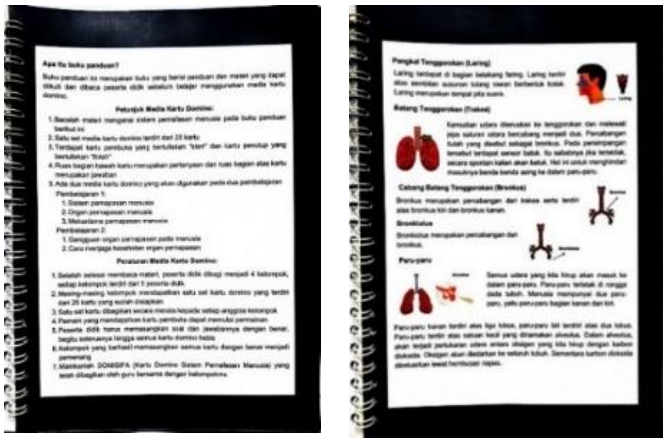

Figure 4. Contents of the guidebook after revision

Based on the picture above, domino learning media has been improved according to input and suggestions by a team of experts. The guidebook is printed using ivory paper on the *cover* and CTS on the contents that are A5 in size, then instructions for using dominoes have been added, and pictures that match the material.

Product Trials

After revising the product design and if the product developed by the researcher has been was deemed for testing by material and media experts, then the researcher conducts a small-scale group product trial consisting of 6 students before domino card media was tested on large-scale groups. Researchers use techniques *purposive sampling* on the implementation of small-scale trials. Technique *side pusrposive* is a sampling technique with certain considerations (Sugiyono, 2016). Selection of students for small-scale trials based on class ranking by selecting 6 students consisting of 2 upper ranks, 2 middle ranks, and 2 lower ranks. Product trials begin by explaining instructions for using domino card media to students. After conducting product trials, researchers provided questionnaires of responses to teachers and students on the domino card learning media developed. This was done to find out how effective the learning media depeloved by researchers were.

The results of the questionnaire of teacher and student responses have very feasible, feasible, quite feasible, less feasible, and feasible criteria which can be seen in table 2. Questionnaire responses are given to teachers and students with the aim of getting input and suggestions on domino card media so that it becomes an improvement and improvement of the product. The use of domino card media must be monitored by teacher and students first before filling out the response questionnaire. The following results of the questionnaire analysis of teacher and student responses to small-scale product trials can be seen in table 8.

Table 8. Results of Responses to Domino Card Media in Small-Scale Product Trials

Respondents	Percentage	Criterion
Teacher	93	Very decent
Student	93	Very decent

According to the recapitulation of the questionnaire assessment, the responses of teacher and students at SDN Patemon 02 to domino card media in small-scale product trials obtained the "Very Feasible" criteria with a percentage value of 93%.

Product Revisions

After conducting small-scale product trials, researchers revise the product again to improve the product developed based on suggestions and input from teacher and students responses questionnaires in the previous stage. The suggestions and input obtained regarding the paper for the domino card box used were too thin so that they were easily torn so that the researcher revised the domino card box by replacing the paper used. Figure 5 shows the results of the revision of domino card media based on input and suggestions from teacher and students.

Based on figure 5, researchers initially used 230 gsm ivory paper, after revision the paper used was replaced by using ivory paper which was thicker than before, namely 310 gsm ivory.

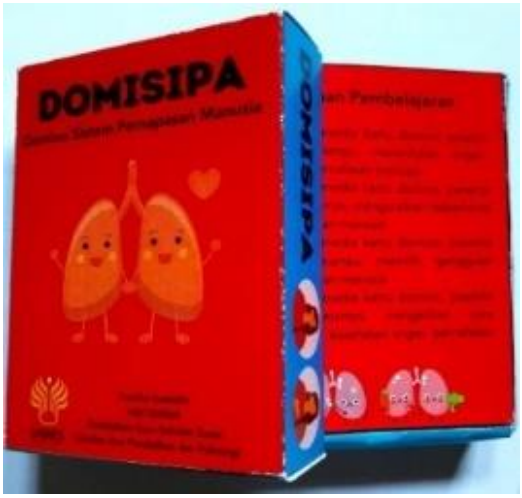

Figure 5. Revision of domino card media box

Usage Trial

This stage is carried out to test products developed based on revisions in the previous stage. After conducting small-scale product trials, then product trials were carried out on a large scale on grade V students of SDN Patemon 02 totaling 20 students. Researchers distributed questionnaires of responses to domino card media to teachers and students. This response questionnaire aims to determine the effectiveness of using domino card media material of the human respiratory system in large-scale trials. Students first do pretest questions to find out students' initial abilities before getting material on the human respiratory system using domino learning media. At the end of learning, students do *posttest* questions to find out changes in student endurance after getting material on the human respiratory system with domino media.

The effectiveness of the product can be seen from the results of questionnaire responses that have been filled out by teachers and students in large-scale product trials on domino learning media that have very feasible, feasible, quite feasible, less feasible, and feasible criteria which can be seen in table 2. Table 9 shows the results of the questionnaire analysis of teacher and students responses to small-scale product trials.

Table 9. Results of Responses to Domino Card Media in Large-Scale Product Trials

Respondents	Percentage	Criterion
Teacher	100	Very decent
Student	100	Very decent

Based on the recapitulation of the questionnaire assessment, the responses of teachers and grade V students of SDN Patemon 02 to domino card media in large-scale product trials obtained the criteria "Very Feasible" with a percentage value of 100%.

In addition to using the results of teacher and student responses, the effectiveness of domino card media that researchers have developed can be known by analyzing student learning outcomes by calculating scores obtained by students through normality tests, t tests, and n-gain tests based on *pretest* and *posttest* results distributed in large-scale product trials. The *pretest* score obtained is the value before students get learning using domino card media. While the *posttest* score is the value obtained after students get learning using dominoes. Table 10 shows the learning outcomes of grade V students of SDN Patemon 02 on the *pretest* and *posttest*.

Table 10. Student Learning Outcomes on *Pretest and Posttest*

Action	Average	Complete students	Incomplete students	Learning completeness
Pretest	52	2	18	10
Postest	78	18	2	90

Table 10 displays the average pretest and posttest scores of class V students at SDN Patemon 02, namely 52 and 78. Based on this data, it shows that there are differences in learning outcomes for class V students at SDN Patemon 02 in science subjects related to the human respiratory system before and after using card learning media dominoes.

Furthermore, the normality test analysis was carried out to determine whether the learning outcomes of grade V students of SDN Patemon 02 on the pretest and posttest were normally distributed or not. The pretest and posttest normality results can be seen in Table 3, and the posttest normality results can be seen in Table 11.

Table 11. Results of the Normality Test of Student Learning Outcomes on Pretest and Posttest

Action	Result
Pretest	0.14
Postest	0.18

Based on table 11, the results of the *pretest* and *posttest* normality test with *the Liliefors* test show that the pretest value normality test has a result of 0.14 and the posttest value normality test has a result of 0.18. If the L.Count result is less than 0.19 from the L.Table, the test criteria for the normality test are declared normally distributed. If the L.Count result is greater than 0.19, the test criteria are declared not normally distributed. As a result, it can be concluded that the learning outcomes of grade V students of SDN Patemon 02 are normally distributed both in the pre- and post-test.

Table 4 shows the t-test testing criteria and table 12 shows the results of the pretest and posttest normality

tests. Following this, the pretest and posttest scores are declared normally distributed.

Table 12. T Test Results Student Learning Outcomes on Pretest and Posttest

Action	Result
Pretest	0.00
Postest	0.00

Based on table 12 test results t values *Pretest* and *posttest* with test *Paired T-Test* indicates that the t-test values and *posttest* has a yield of 0.00. The t-test criteria show that there is a significant difference if the P-value is <0.05 and there is none if the P-value is >0.05. Thus, it can be concluded that the learning outcomes of V grade students of SDN Patemon 02 are significantly different between the pretest and posttes*t*.

Furthermore, the n-gain test was conducted to determine the average increase in pretest and posttest scores. The t-test testing criteria are presented in table 5, and the pretest and posttest normality test results are presented in table 13.

Table 13. N-Gain Test Results Student Learning Outcomes on Pretest and Postest

Action	Average	Average difference	N-gain value	Criterion
Pretest	52	26	0.55	Keep
Postest	78			

Grade V students of SDN Patemon 02 had an average increase of 0.55 with an average difference of 26 with "Moderate" criteria, according to the n-gain test results shown in table 13. Therefore, domino cards are an effective learning tool for science material on the human respiratory system and can improve the learning outcomes of grade V students of SDN Patemon 02.

Based on the results of large-scale product trials and teacher and students responses, it can be concluded that domino cards are an effective learning media to be applied in social studies learning in the classroom. The results achieved by students after completing the learning process are referred to as learning outcomes. (Fandos-Herrera et al., 2023). According to Akhiruddin et al. (2019) learning outcomes are the end result of the learning process, which will lead to the desired behavior. Desired behaviors may include the cognitive ability to adapt to the learning process. Student learning is considered successful when they have acquired the necessary cognitive skills (Susilawati et al., 2020). Students enthusiasm and interest in learning can be raised by learning media (Firdawati et al., 2021). Domino card learning media encourages students to be more engaged and excited in the lesson compared to monotonous learning media (Nirwana et al., 2023).

Other research that supports this research study was conducted by Insani et al. (2023) entitled "Development of Qimono Card Media (QR Domino) on Science Learning Breathing Material for Grade V Students of SDN 22 Ampenan. The study's findings demonstrated the outcomes of validation by media validators, who scored an average of 95.5% in a very good category and deserving of use in education, and material validators, who scored an average of 94.7% in a very decent category. The results of the student response questionnaire received a score of 93.33% with the category "very good". Based on the overall assessment results given, it can be concluded that Qimono card learning media is declared very suitable for use in learning Breathing science material in grade V elementary school.

Previous research that has been done by Istyasiwi et al. (2021) entitled Development of Food Chain Domino Card Digital Media (DORAMA) in Science Learning in Elementary Schools. Experts in material science, media, and linguistics are involved in the expert testing procedure. As a result of their 100% material expert test validation findings, they are deemed "very feasible". Similarly, their 85.5% media expert test validation results also indicate "very feasible" status, and their 91.6% linguist test validation results are deemed "very decent". On average, the test scores of the three experts obtained a score of 92.3% and can be said to be "very decent". The product test was conducted consisting of 5 students who lived close to the researcher. Test results *one to one* The 5 students produce an average of 93.5% which can be said to be a "very decent" product. This shows that DORAMA Card game media is worthy of being used as a learning medium for Food Chain Science material.

Other research conducted by Nirwana et al. (2023) entitled "Development of Domino Card Media in Science Learning Material Structure and Function of Grade IV Elementary School Plants" Learning media in the form of domino cards The material that has been developed has been tested through media validation questionnaires by getting an average assessment of 86% categorized as very good, material validation questionnaires with an average assessment of 92% categorized as very good, individual group trials with an average assessment of 90% which are categorized as very practical, and small group trials with an average rating of 89% which are categorized as very practical. This shows that media is very feasible to be used in the learning process.

Research conducted by Manasikana et al. (2022) entitled "Development of Domino Cards as a Learning Media for Temperature Material and Its Changes" The assessment results were obtained from 3.82 media experts, 3.25 material experts in the very valid category. The results revealed an extremely practical category

with a 94.45% implementation percentage. In the extremely practical category, the average positive reaction from students was 96.88%. It was given nearly the same score of 84.37 on the posttest, and the completion had an effective rating of 75%. The domino media about temperature and its changes is very correct, very useful, and very efficient.

Based on these, it can be concluded that domino card learning media can improve student learning outcomes in science subjects of human respiratory system material class V SD Negeri Patemon 02.

Conclusion

Based on the results of research that has been done, it can be concluded that domino card learning media can improve science learning outcomes of grade V students of SD Negeri Patemon 02 on human respiratory system material. This is evidenced by the results of the product feasibility assessment in the "Very Decent" category by obtaining an average of 95% from material experts and 93% from media experts. Data analysis *of students' pretest* and *posttest scores* increased by an average difference of 26 and an N-Gain of 0.55 which was included in the "Medium" criterion. This proves that domino card learning media is effective for improving the learning outcomes of grade V students in science subjects of human respiratory system material.

Acknowledgments

Thank you to the thesis supervisor who has guided the research process and writing this article to completion. Thank you to SD Negeri Patemon 02 for helping and allowing the research process. Thank you to Universitas Negeri Mataram for facilitating the creation of the article and to the editors who have reviewed and studied this article. Thank you, your parents, siblings, and comrades in arms for your prayers and support.

Author Contributions

Y, A. contributes to conducting research, developing products, analyzing data, and writing articles. D, W. as a supervisor in research activities to article writing.

Funding

This research is a research funded by private funds owned by researchers, does not receive funding from outside parties.

Conflicts of Interest

The researcher stated that he did not have a research conflict.

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