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Development of 3D Motion Diorama Learning Media to Improve Students' Critical Thinking Skills

Pengembangan Media Pembelajaran Diorama Gerak 3D untuk Meningkatkan Kemampuan Berpikir Kritis Siswa

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Abstract

The research and development of this 3D motion diorama media is pushed by the low critical thinking ability of grade VI students at SD Negeri 010140 Perkebunan Gunung Melayu. The purpose of this study is to develop teaching materials in the form of 3D motion diorama media about the subject of the solar and lunar eclipse to improve the critical thinking skills of sixth grade students. This research uses the Research and Development (R&D) method with the Analysis, Design, Development, Implementation, and Evaluation (ADDIE) model developed by Robert Maribe Brach. The results of the study show that; first, the dioramic media developed was declared very valid by experts, with a media feasibility percentage of 93% along with material feasibility of 94%, while the feasibility of the question instrument was 93%. Assessment by teachers obtained an average of 97% while student assessment obtained an average of 99%. Second, classroom trials showed a significant improvement in students' critical thinking skills, with an average pretest score of 52.7 and post-test score of 91.7 (a difference of 39 points), and an N-Gain of 0.82, indicating a high category. The implications of the use of 3D motion diorama media are also able to improve critical thinking skills. The use of this media in understanding the concept of celestial eclipses also very clearly shows the active involvement of students. This study recommends the application of similar media in sciences subject learning to support the development of students' critical thinking skills in primary school.

Keywords: Learning Media, 3D Motion Diorama, Critical Thinking Skills

Abstrak

Penelitian dan pengembangan media diorama gerak 3D ini dilatarbelakangi oleh rendahnya kemampuan berpikir kritis siswa kelas VI di SD Negeri 010140 Perkebunan Gunung Melayu. Tujuan dari penelitian ini yaitu mengembangkan bahan ajar berupa media diorama gerak 3D pada materi gerhana matahari dan bulan untuk meningkatkan kemampuan berpikir kritis siswa kelas VI. Penelitian ini menggunakan metode Research and Development (R&D) dengan model Analysis, Design, Development, Implementation, and Evaluation (ADDIE) yang dikembangkan oleh Robert Maribe Brach. Hasil penelitian menunjukkan bahwa pertama, media diorama yang dikembangkan dinyatakan sangat valid oleh para ahli, dengan persentase kelayakan media 93% dan kelayakan materi 94% sedangkan kelayakan instrument soal 93%. Penilaian oleh guru memperoleh rata-rata sebesar 97% sedangkan penilaian siswa memperoleh rata-rata sebesar 99%. Kedua, uji coba di kelas menunjukkan peningkatan signifikan dalam kemampuan berpikir kritis siswa, dengan rata-rata nilai pretest 52,7 dan posttest 91,7 (selisih sebesar 39 poin), serta N-Gain sebesar 0,82, yang menunjukkan kategori tinggi. Implikasi penggunaan media diorama gerak 3D ini ternyata mampu meningkatkan kemampuan berpikir kritis, di sisi lain juga dalam penggunaan media ini dalam memahami sebuah konsep gerhana terlihat sangat jelas juga sangat terlihat keterlibatan aktif siswa. Penelitian ini merekomendasikan penerapan media serupa dalam pembelajaran sains untuk mendukung pengembangan keterampilan berpikir kritis siswa di sekolah dasar.

***Kata Kunci**: Media Pembelajaran, Diorama Gerak 3D, Kemampuan Berpikir Kritis.*

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INTRODUCTION

Thinking is an activity involving cognitive processes in receiving various information obtained in order to decide the right action on a problem (Lismaya, 2019). Etymologically, the word "critical" is derived from the Ancient Greek word *krites* meaning "one who gives a reasoned opinion" or "analysis", "value consideration", "interpretation", or "observation" (Sihotang, 2019). Critical thinking is an activity that is carried out systematically, guided by the principles of logic, and considers various points of view in order to understand and be able to manage information that aims to reject, accept or be suspended (Herman et al., 2024). Critical thinking can also be interpreted as the ability to think at a higher level in analyzing, preparing logical arguments, developing strategies, evaluating, being able to solve problems and draw conclusions (Prasasti & Anas, 2023). According to Ennis in (Riyanto et al., 2024), critical thinking is thinking rationally and reflectively with an emphasis on making decisions about what to believe or do. Furthermore, Robert Ennis explained that critical thinking consists of 5 aspects; providing simple explanations, building basic skills, concluding, making further explanations, and organizing strategies and tactics (Ananda & Tanjung, 2022). Based on the aforementioned statements, it can be concluded that critical thinking is a person's ability to think in order to solve problems by making decisions from various information obtained.

Critical thinking is one of the skills that are needed in the 21st century (Humairoh et al., 2024). The 21st Century is an era where this century demands quality human resources. Therefore, educational institutions need to develop the existing potential for their institution and be able to produce *superior* outputs (Hasibuan & Prastowo, 2019). The 21st century learning process is a kind of learning characterized by *learning skills, skills,* and literacy (Mulin et al., 2022). To survive the challenges and complexities of the complex 21st century life, this generation must have a wide range of skills. The skills needed for the 21st century are for everyone to master the 4Cs to achieve success and can be a part of society in the 21st century. The 4C skills are *Communication, Collaboration, Critical Thinking and Problem Solving, Creativity and Innovation* skills (Widodo & Wardani, 2020). 21st century learning is a kind of learning designed to prepare the next generation to become a generation that is not only able to master academic knowledge, but also have skills and attitudes that are relevant to the changing times. Through education, humans

can acquire various abilities and can develop the abilities they have to be applied in life (Syahfitri et al., 2022).

From the results *of the 2022* Program for International Student Assessment (PISA) *released at the Organisation for Economic Cooperation and Development* (OECD), Indonesia is ranked 67th out of 81 countries. TIMSS is an international study initiated by *the International Association for the Evaluation of Educational Achievement* (IEA) to assess students' abilities in Mathematics and Science, and is conducted every four years. In the 2015 TIMSS, the focus of the research was on fourth grade elementary school students in Indonesia to assess their achievements in the field of Mathematics and Science in an international context. Indonesia shows a low ranking compared to several other Asian countries. Indonesia's science score in the results of the TIMSS survey in 2015 was 397. These results place Indonesia in the 35th position out of 48 countries (2015). After that, Indonesia no longer participated in this event (Wicaksono et al., 2020).

Based on the results of observations and interviews conducted to the sixth grade students of SD Negeri 010140 Perkebunan Gunung Melayu in the science subject of solar and lunar eclipse, the data that was obtained inferred that the students' critical thinking skills are relatively low, which can be seen from the results of the daily test scores of students who have not yet reached the minimum score criteria (KKM). The minimum score in science subjects at the school is 75, while the score obtained by students is still below the criteria which is 50-65. In addition, it was found that most students showed low levels of critical thinking ability. Students who fell into the low critical thinking ability criteria can be seen in how they showed a lack of interaction, both in asking and answering questions that should need explanation, and students who could not identify or consider the source of information can be trusted or not. This happens because of the learning atmosphere that decreases the students' interest in solar and lunar eclipse subjects, the lack of interesting and interactive learning media, and the lack of teachers' ability to facilitate interactive learning.

For example, in real life when learning science in class, students are asked to explain the position of the sun, the moon, and the earth, and explain the process of solar and lunar eclipses, but some students become passive in class, and some even show boredom with learning in class. To increase students' enthusiasm and creativity, it can be done through the use of learning media in the classroom (Dumayanti & Kusumawati, 2024). Critical thinking skills do not appear just like that, but require stimulation or

stimulating activities. The application of critical thinking can be done through the development of interactive media and learning (Anisa & Siregar, 2024). With the use of dioramas, they can facilitate a deeper understanding of complex scientific concepts.

Diorama media is a learning medium that describes or illustrates an event in the form of three dimensions that are small in size. According to (Hendrik et al., 2021), diorama media is a three-dimensional learning medium that is in miniature shape with the aim to demonstrate and illustrate the actual shape visualized in the classroom. Meanwhile, according to (Pratama, 2023), diorama is a medium that can attract students' attention made from a scene in three dimensions, with color guides and several objects to demonstrate a situation in a small scale. Based on some of the definitions above, it is concluded that diorama media is a learning medium in the form of a small, three-dimensional model that describes or demonstrates a situation in real life.

The use of diorama media is very important, especially in subjects that require learning activities by giving direct experience to students such as science subjects. Science is a subject with the goal to understand the universe through direct observation, reasoning, and a good understanding of concepts (Diana et al., 2022). Science is related in how to find out about nature systematically, that science is not only the mastery of a collection of knowledge in the form of facts, concepts, or principles, but also a way to know and understand natural phenomena through the process of observation and experimentation (Aufa et al., 2023). Science learning can be completed using diorama media because dioramas can provide direct experience, able to show objects in whole, and able to show the organizational structure clearly and can show the flow of a process in detail and detail (Murdani et al., 2024). Critical thinking skills can be possessed by students by providing opportunities for students in scientific activities in dioramas to solve various problems.

Many studies have been conducted on the development of diorama media in science subjects, but there are still few who have done the development of diorama on solar and lunar eclipse subjects at the elementary school level, such as the research conducted by (Karimah et al., 2023) with the title "Development of Digital-Based Diorama Learning Media Types of Work Materials for Grade III Elementary School Students". The results of this research show that diorama learning media has a level of validity of 97.08 percent and a level of practicality and attractiveness of 97.6 percent.

In other researches, there are those who develop media on lunar and solar eclipse subjects, but their research does not focus on improving critical thinking skills, but focuses on student learning outcomes carried out by (Sukmawati, 2024) with the title "Development of Alga Sina Media (Eclipse Simulation Teaching Aids) to Improve the Learning Outcomes of Grade VI Students in Science Subjects of Eclipse Materials SDN 1 Dadapan". The results obtained in this study were 91.5% with the category of very feasible and the average student learning outcomes were 85.5. So it can be concluded that Alga Sina media is very effective in learning.

Then, a study conducted by Shola Ningsih & Novita Frizka (2024) explained that the validation results from the material expert validators obtained a score of 76.3% with the "feasible" category, and the results of the media expert validators obtained a score of 98.4% with the "Very Feasible" category. This proves that this diorama media is very feasible and safe to use in early childhood learning activities. The results of the teachers' interview also stated that diorama media is suitable for use in early childhood learning activities. Based on the assessment score criteria, it can be said that the Development of Diorama Media in Early Childhood is valid and very feasible to be used in the early childhood learning process.

The research conducted by Rina, et al (2024) with the title "Development of Problem-Based Learning-Based Diorama Media in Grade IV Scientific Learning at SDN Sedayu Kapubaten Kendal" explained that the average score result was 90%, while the average score result from the subject matter expert was 87.5%. The average score results of the two validators obtained as much as 89%, including in the vulnerable 80% - 100%, categorized as "very good". The results of the student response questionnaire that have been calculated in the table above obtained an average percentage score of 96.5%, while the results of the teacher response questionnaire obtained an average percentage score of 92%. So the average score of the two respondents, which is 94%, is included in the vulnerable 80-100%, so it is categorized as "very good". Based on the above results, it can be stated that diorama media is worthy of acceptance at SDN Sedayu Kendal.

Furthermore, the research conducted by Desy & Sutarini (2024) with the research title "Development of Three-Dimensional Diorama Media Based on Local Wisdom in Thematic Learning in Grade IV Elementary School" explains that the Three-dimensional Diorama learning media Based on Local Wisdom in Thematic Learning in Grade IV of Elementary School is "Very Feasible" with details of the percentage of feasibility provided

by media experts of 81% with the category "Very Feasible", material experts by 72% with the category "Feasible", Learning Experts by 82% with the category "Very Feasible", from that it can be concluded that the Three-dimensional Diorama learning media based on Local Wisdom in Thematic Learning in Grade IV of SD Negeri 064954 Medan Amplas. It is suitable for use by students during the learning process.

In this case, the research will be carried out with the concept of developing an interactive 3D motion diorama learning media, while previous research may focus more on static learning media. This research also uses the latest technology to develop 3D motion diorama learning media, whereas previous research may have used older technology. In addition, this study also has a strong focus on developing students' critical thinking skills, whereas previous research may have focused more on other aspects such as knowledge or skills. This research also developed a 3D motion diorama learning medium that is contextual to students' daily lives, whereas previous research may have focused more on more abstract content. Thus, the research that will be conducted has significant novelty compared to previous research.

The research gaps on the development of 3D motion diorama learning media to improve students' critical thinking skills are that previous research may focus more on the development of other learning media, such as videos or applications, while research focuses more on improving students' abilities, showing that there will be gaps in research on the development of 3D motion diorama learning media.

Based on the explanation above, the implications contained in this study are that this research can help learning media developers to create learning media that are more effective in improving students' critical thinking skills. This research can also help teachers to improve the quality of learning by using 3D motion diorama learning media that is more interactive and effective and this research can help students to develop better critical thinking skills, so that they can be better prepared to face future challenges.

Based on this, the researcher created and developed the 3D motion diorama media in science subjects on solar and lunar eclipse subject can help students understand the concept of eclipses better, and can hone and improve their critical thinking skills.

RESEARCH METHODS

The method applied in this research is *Research and Development* (*R&D*) which can be interpreted as research and development. The *R&D* method is a research technique used to produce a specific product and evaluate its effectiveness. Borg and Gall in

(Sugiyono, 2021) define that research and development are research methods used to develop and validate products used in learning. The research was conducted at SD Negeri 010140 Perkebunan Gunung Melayu in grade VI students of SD Negeri 010140 Perkebunan Gunung Melayu with a total of 15 students.

In this study, researchers will develop a product in the form of 3D motion diorama media. *ADDIE* is an acronym for *Analysis, Design, Development, Implementation, and Evaluation*. The stages of this research are: (1) *Analysis*, the analyses carried out aim to support this development process, including needs analysis, material analysis, and performance analysis; (2) *Design*, the next stage is the initial design stage of diorama media by collecting data in the form of information and concepts related to 3D motion diorama media; (3) *Development*, the dioramas media that have been designed are then validated by media expert validators and material experts, the validation process is carried out to produce teaching materials with good feasibility to be applied in elementary schools; (4) *Implementation*, the next stage is to conduct a trial for students, the application of 3D motion diorama media is carried out in grade VI of SD Negeri 010140 Perkebunan Gunung Melayu; (5) *Evaluation*, this stage was carried out to determine the success of the development of 3D motion diorama media in the subject of science of solar and lunar eclipse materials. The procedure for developing 3D motion diorama media with *the ADDIE* model can be seen in figure 1.

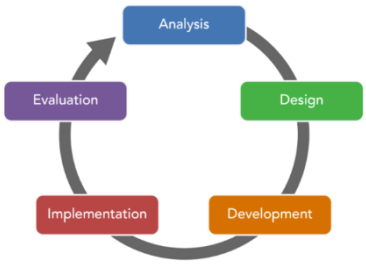

Figure 1. Model *ADDIE*

The data collection techniques used by the researcher in this study were interviews, critical thinking skills rubrics, validation sheets, critical thinking tests, and student response questionnaires. The data that has been obtained is analyzed qualitatively and quantitatively. Qualitative analysis was used to describe the product development process, while quantitative analysis was used to describe product quality assessments, response questionnaires and critical thinking skills tests. The results of the data analysis were used for product improvement.

The average score was interpreted based on the validity level category presented in table 1 as follows:

Table 1. Category Validity Level of 3D Motion Diorama Media

No	Information	Score
1	Highly Valid	81% - 100%
2	Valid	61% - 80%
3	Quite Valid	41% - 60%
4	Less Valid	21% - 40%
5	Invalid	0% - 20%

The average score was interpreted based on the category of practicality presented in table 2 as follows:

Table 2. Category Level of Practicality of 3D Motion Diorama Media

No	Information	Score
1	Very Practical	81% - 100%
2	Practical	61% - 80%
3	Quite Practical	41% - 60%
4	Less Practical	21% - 40%
5	Impractical	0% - 20%

The results of the average value obtained after being searched with the gain formula, then interpreted into table 3. The following is the gain rate criteria:

Table 3. Gain Rate Criteria

G	Information
n-gain > 0,7	Tall
0,3 ≤ n-gain ≤ 0,7	Keep
n-gain < 0,3	Low

The average score was interpreted based on the category of students' critical thinking ability level presented in table 4 as follows:

Table 4. Critical Thinking Ability Level

Ability Level	Value
Very Critical	81 – 100
Critical	61 – 80
Quite Critical	41 – 60
Less Critical	21 – 40
Very Less Critical	0 – 20

RESULT AND DISCUSSION

This research produced a product in the form of 3D motion diorama media in the subject of science on solar and lunar eclipse subject for the sixth grade elementary school students, the stages that have been carried out by researchers include:

Analysis Stage

This stage is the first step for the researcher in designing the 3D motion diorama media developed. This diorama media was developed to improve students' critical thinking skills. The stages are:

Needs Analysis

The results obtained from the observations and interviews can be concluded into several characteristics of students during the learning process, which are:

- Learners. The researcher conducted an analysis of students by directly observing the basic characteristics of the sixth grade students at SD Negeri 010140 Perkebunan Gunung Melayu that students do not pay attention to the teacher, students look vulnerable to boredom and boredom, when the learning process takes place, students tend to play with their classmates, and they tend to be interested in other things that interest them.
- The learning process in the classroom. During the learning process, some students only listen, take notes, and then do the assignments given by the teacher.
- Teaching materials used. In the learning process, the teaching materials used were not optimal. When the homeroom teacher was interviewed, it was found that SD Negeri 010140 Perkebunan Gunung Melayu had not been using media in the learning process, and the teacher only explained based on the books provided by the school.

Based on these problems, the researcher concluded that because the teaching materials used were not optimal, supporting learning media was needed. The 3D motion diorama media can overcome existing problems that aim to provide students' interest and enthusiasm in the learning process so that students can optimize their critical thinking skills.

Material analysis

Material analysis is the analysis to determine the content of the material that wad taught according to the product to be produced, as well as the selection of the learning method used. Through this analysis, it aims to enable students to achieve the desired competencies and be able to fulfill the main tasks that must be mastered so that they can meet learning outcomes. The material that was used, chapter 5 Topic A, and can be seen in Figure 2.

Tahap Pengajaran	Jumlah JP	Materi Pokok	Tujuan Pembelajaran per Tahapan	Strategi Pengajaran	Referensi dan Media Ajar
Topik A: Menjelajahi Bumi, Bulan dan Matahari	5	1. Revolusi dan Rotasi Bumi 2. Revolusi dan Rotasi Bulan	1. Peserta didik memahami perbedaan gerak rotasi dan revolusi. 2. Peserta didik memahami fungsi model atau simulasi sebagai alat bantu untuk menganalisa dan memberikan prediksi 3. Peserta didik bisa menjelaskan hubungan Bumi, Bulan dan Matahari disertai dengan bukti dari hasil simulasi	1. Orientasi topik 2. Aktivitas eksplorasi 3. Membuat prediksi 4. Pembuatan model 5. Diskusi bersama teman 6. Presentasi 7. Refleksi bersama 8. Belajar lebih lanjut 9. Memilih tantangan (opsional)	• Perlengkapan peserta didik: 1. Alat tulis 2. Buku tugas 3. Alat mewarnai 4. Kertas karton 5. Kancing tekan/ kancing jepret 6. Gunting 7. Lem • Persiapan lokasi: 1. Halaman sekolah 2. Pengaturan tempat duduk berkelompok.

Figure 2. Material Content Coverage Information

Performance analysis

Performance analysis was conducted to see the extent to which students can understand the scientific concepts involved in eclipse phenomena and how they can relate that information to rational and logical reasoning. This analysis can be carried out through *a pre-test* to measure students' initial understanding of the concept of eclipses. From the results of the *pre-test*, it can be seen that students already understand the concept of celestial eclipses but are still often mistaken about the eclipse process and the impact of the eclipse phenomenon on real life and are still unable to explain the eclipse phenomenon scientifically.

Design Stage

At the design stage, the researcher prepared a plan for the 3D motion diorama media which included the design of the media, the selection of manufacturing materials, and the determination of the material to be applied to the media. This planning process involves several important steps, including: (1) designing the eclipse in digital form, (2) selecting materials to be used to improve the quality of the planned media. The main components in 3D motion diorama media are; projection of the sun, moon and earth. The materials that were used are: 1) Pipe cup caps, 2) Pipa paralon, 3) woot, 4) sterofoam, 5) wire, 6) plastic ball, 7) pilox, 8) small switches, 9) lightbulbs, 10) light fitting, 11) dynamo, 12) car wheels, 13) lamp cable, 14) cat acrylic, 15) glue and 16) bottle caps.

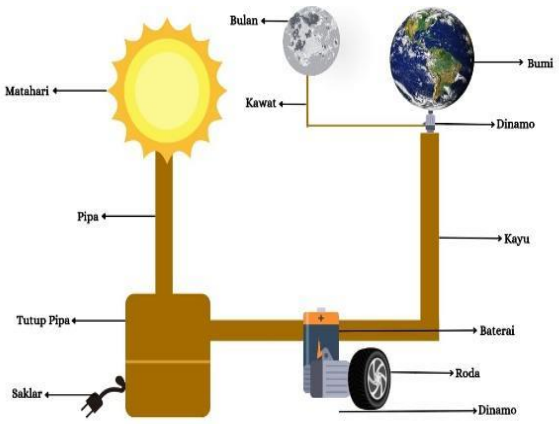

Figure 3. Sketch of Eclipse 3D Motion Diorama Media Design

Development Stage

The third stage is *development*. The 3D motion diorama media was finished and realized in the form of the final product that was ready to be tested to students. During the development process, the researchers have created a 3D motion diorama medium that conforms to the previously established design. The following is an overview of 3D motion diorama media that has been successfully made into a finished product.

Figure 4. Eclipse 3D Motion Diorama Media

The finished 3D motion diorama media was then validated by 3 expert validators to determine the feasibility of the media made. Eligibility consisted of the feasibility of media, materials, and questions. The aspects assessed by media experts were the aspects of material, appearance, and quality of media. The aspects that were assessed by material experts are aspects of material content, material presentation and material usefulness. While the aspects that were assessed by the question experts are the aspects of material, construction and language.

Media Eligibility

The feasibility of the 3D motion diorama media was assessed from the validation of media experts. The results of the validation by media experts can be seen in table 5. next.

Table 5. Media Expert Validation Results

Aspects	Scores Obtained	Maximum Score	Persentase	Criterion
Material	11	12	92%	Highly Valid
Media Quality and Appearance	15	16	94%	Highly Valid
Sum	26			
Maximum Score	28			
Percentage	93%			
Category	Highly Valid			

Based on data from table 5, the results of the evaluation of 3D motion diorama media by the validators showed a score of 26 out of a maximum score of 28, with a percentage of 93%. This result put the 3D motion diorama media into the "highly valid" category. Thus, the study shows that the 3D motion diorama media regarding solar and lunar eclipses developed by the researcher can be considered valid and ready to be implemented in the field.

Material Eligibility

The feasibility of the material in the 3D motion diorama media is known from the validation of material experts. The results of validation by the subject matter experts can be seen in table 6.

Table 6. Material Expert Validation Results

Aspects	Scores Obtained	Maximum Score	Persentase	Criterion
Material Contents	14	16	88%	Highly Valid
Presentation of Materials	23	24	96%	Highly Valid
Material Usefulness	8	8	100%	Highly Valid
Sum		45		
Maximum Score		48		
Percentage		94%		
Category		Highly Valid		

Based on table 6, the validation evaluation of 3D motion diorama media showed a score of 45 out of a maximum score of 48, with a percentage of 94% in the "very valid" category. From these results, it can be concluded that the 3D motion diorama media

regarding solar and lunar eclipses developed by the researcher can be considered valid and ready to be implemented in the field.

Question Eligibility

The feasibility of the questions in 3D motion diorama media was assessed by the validation of question experts. The results of validation by question experts can be seen in table 7.

Table 7. Question Expert Validation Results

Aspects	Scores Obtained	Maximum Score	Persentase	Criterion
Material	19	20	95%	Highly Valid
Construction	9	10	90%	Highly Valid
Language	14	15	93%	Highly Valid
Sum		42		
Maximum Score		45		
Percentage		93%		
Category		Highly Valid		

Based on data from table 7, the results of the evaluation of the pre-test and post-test questions by question validators showed a score of 42 out of a maximum score of 45, with a percentage of 93%. This puts the questions by the researchers in the "very valid" category. Thus, the research shows that the pre-test and post-test questions regarding solar and lunar eclipses developed by the researcher can be considered valid and ready to be implemented in the field.

The following is the recapitulation of the average score of the 3D motion diorama media validity test.

Table 8. Results of the Assessment Recapitulation from the Validator

No	Validation	Average	Category
1	Media Validity Test	93%	Highly Valid
2	Material Validity Test	94%	Highly Valid
3	Test the Validity of the Question	93%	Highly Valid
Mean		93%	Highly Valid

Implementation Stage

The fourth stage is *implementation*. The 3D motion diorama media that has been developed and is suitable for use, then tested in the learning process of the science class with the subject of solar and moon eclipses subjects in the sixth grade elementary school.

The practicality of the 3D motion diorama media can be assessed based on the value of student response questionnaires, as well as the effectiveness of 3D motion diorama media based on *the results of pretest* and *posttest,* the test used is a description test.

Practicality of 3D Motion Diorama Media

During the lesson, students seemed very enthusiastic in following the learning process. During the learning process by using 3D motion diorama media, students can more easily understand the relative position between the sun, earth and moon. The 3D motion dioramas provide opportunities for students to see and feel the movement of celestial bodies for themselves, so as to simplify students' understanding of abstract concepts.

Practicality was measured using an assessment instrument in the form of teacher and student response questionnaires. The questionnaire was used to determine the level of practicality in the 3D motion diorama media trial that had been developed. The results of the data obtained can be seen in the following table.

Table 9. Recapitulation of Teacher's Response Questionnaire

Aspects	Scores Obtained	Maximum Score	Persentase	Criterion
Material	25	25	100%	Very Practical
Media	38	40	95%	Very Practical
Sum		63		
Maximum Score		65		
Percentage		97%		
Category		Very Practical		

Table 10. Recapitulation Of Student Response Questionnaire

Aspects	Scores Obtained	Maximum Score	Persentase	Criterion
Attraction	225	225	100%	Very Practical
Material	149	150	99%	Very Practical
Usefulness	372	375	99%	Very Practical
Sum		746		
Maximum Score		750		
Percentage		99%		
Category		Very Practical		

Based on the results of practicality by teachers and students on the 3D motion diorama media on solar and lunar eclipse subject, it can be concluded that both respondents consider the 3D motion diorama media to be very practical. The teacher gave a validity rating of 97% while the student gave a score of 99%, both of which were in the "very practical" category. Thus, the overall assessment of the practicality of the two groups

of respondents was 98%, confirming that the 3D motion diorama media was very practical to be used in learning.

Effectiveness of the 3D Motion Diorama Media

The results of the recapitulation of *students' pre-test* and *post-test* scores can be seen in table 11.

Table 11. Pretest and Posttest Score Recapitulation

No	Name	Value		Post - Pre	Skor Ideal (100) - Pre	N-Gain Score	N-Gain Persen	Criterion
		Pretest	Postest					
1	Aska	50	85	35	50	0,7	70	Keep
2	Aurell	45	95	50	55	0,909	90,9	Tall
3	Ayu	55	90	35	45	0,778	77,8	Tall
4	Deyca	45	95	50	55	0,909	90,9	Tall
5	Fahmy	50	95	45	50	0,9	90	Tall
6	Icha	60	90	30	40	0,75	75	Tall
7	Khori	60	90	30	40	0,75	75	Tall
8	Marvel	55	95	40	45	0,888	88,8	Tall
9	Miara	45	85	40	55	0,727	72,7	Tall
10	Rahmi	50	95	45	50	0,9	90	Tall
11	Rizki	50	95	45	50	0,9	90	Tall
12	Shylla	50	95	45	50	0,9	90	Tall
13	Sifa	55	95	40	45	0,888	88,8	Tall
14	Syahmi	60	80	20	40	0,5	50	Keep
15	Yoga	60	95	35	40	0,875	87,5	Tall
Average		52,7	91,7			0,82	82	Tall

Based on table 11, the number of students who took the *pre-test* and *post-test* was 15 students. The average score obtained from the *pre-test* was 52.7. Meanwhile, the average score of the *post-test* amounted to 91.7, which means that the average score was at the level of "very critical" thinking. There was an increase in the critical thinking level of students, which was 0.82. This shows that the level of critical thinking of students increased after the use of 3D motion diorama media in learning, by referring *to the pretest* and *posttest* scores obtained with an n-gain value of 0.82 and meeting the n-gain range of > 0.7 with the high category.

Evaluation Stage

The last stage is evaluation. The 3D motion diorama media that has been validated was then tested to see the level of effectiveness and practicality to be applied in science learning solar and lunar eclipse subjects. After a trial run, there were no suggestions and inputs or special criticisms from users that can be used as revisions for product

improvement. Based on the evaluation carried out, it was inferred that the valid 3D motion diorama media according to the expert team of validators was positively assessed by teachers and students in the trial of the 3D motion diorama product so that the diorama media did not undergo any revision for the implementation stage.

The problem for this research is the lack of use in references of learning media that make learning activities more effective with using methods that have often been carried out. This triggers the understanding of students who think that only textbooks and guidebooks are the main source of knowledge and reference, thus causing a lack of students' desire to learn. In addition, the limited learning facilities caused low critical thinking skills of students.

Based on the research carried out on March 7, 2025 at SD Negeri 010140 Perkebunan Gunung Melayu, Rahuning District, it was found that the 3D motion diorama media produced a significant influence on students' critical thinking skills. Based on the results of the research conducted in the sixth grade class, it began with a *pre-test* analysis which had an average score of 52.7, and then continued with a *post-test* analysis which had an average score of 91.7 students' critical thinking skills. This shows that students have a good improvement with an increase in students who have a difference of 39 points.

At the stage of developing diorama media validated by 3 expert validators, the feasibility of the 3D motion diorama media received a very feasible category with a score percentage of 93%. In terms of material feasibility, the 3D motion diorama media received a very decent category with a percentage of 94%. Meanwhile, for the feasibility of the questions, the 3D motion diorama media got a score percentage of 93% and was included in the very feasible category. This shows that this 3D motion diorama media is suitable for use as additional teaching materials for teachers in the science learning process on solar and lunar eclipse subjects in elementary schools. This is in line with the research by (Dewi et al., 2021) which states that the assessment of the good or feasible from the validator after the revision of the development product is carried out shows that the development product is already suitable for use in the learning process.

This 3D motion diorama media is very suitable for use in the learning process. This can be seen from various aspects. First, the material presented on the 3D motion diorama media is in accordance with learning outcomes, and helps students understand solar and lunar eclipse material in a direct way. The second is media design that includes clear shapes, color combinations and their use so that students can understand the material

directly. Learning media is a tool used to achieve educational goals. Learning media will make learning easier for teachers and will increase learning effectiveness (Putra & Suniasih, 2021).

The results of the study conducted by (Lestari et al., 2024) regarding the use of 3D diorama learning media on the learning outcomes of third grade students on weather change materials stated that 3-dimensional media can improve learning outcomes with post-test data results of 86.23, which was higher than the pre-test results of 53.30. These results stated that there was a significant influence between 3-dimensional diorama media on student learning outcomes.

Based on the results of the study, learning using the 3D motion diorama media had a positive impact on students to think more critically about solar and lunar eclipse materials, and it can also be found that the learning process was more active and effective when using media than not using media. It is clear how the influence and difference in the use of media can stimulate students' activeness in learning. Without using the 3D motion diorama media, there are still many students who lack enthusiasm and lack enthusiasm and are confused when answering the questions given. The learning process that makes students feel happy and enthusiastic will push them to be more curious and interested in learning, making the results obtained are more satisfying.

CONCLUSION

The product produced in this research and development is a 3D motion diorama media for science learning in grade VI elementary schools. Through a series of validations by media experts, material experts, question experts, and teachers as practitioners, this 3D motion diorama media was declared valid and suitable for use as accompanying teaching materials in learning. Validation by media experts ensures that the appearance and interactivity of the media are engaging and encourage students to use them. Validation by subject matter experts ensures that the content presented is in accordance with the curriculum and is able to improve understanding of science concepts. Question validation ensures that the questions given are easy for students to understand and are able to improve students' critical thinking skills. Meanwhile, validation by teachers as practitioners ensures that this 3D motion diorama media is practical and effective to use in the context of learning. Thus, this 3D motion diorama media is not only valid academically but also practical and interesting for students, thus it can be relied on to improve the quality of science subject learning in sixth grade of elementary school.

This research has significant implications in the development of 3D motion diorama learning media to improve students' critical thinking skills. By using this learning medium, students can more easily understand complex concepts and develop their critical thinking skills. The results of this research can also be used as a reference for the development of other learning media that are more effective and efficient. In addition, this research can also help teachers in developing more innovative and fun learning strategies for students. For future research, it is recommended to conduct more comprehensive and in-depth follow-up research. In addition, it is also recommended to develop this research to high school or university level to see the effectiveness of the 3D motion diorama learning media in improving students' critical thinking skills at a higher level.

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