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The Feasibility of Water Cycle Diorama Media Based on Quizizz Paper Mode to Improve Learning Outcomes of Fourth Grade Elementary School Students

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Abstract: This study aims to develop and test the feasibility of the Water Cycle Diorama Media Based on Quizizz Paper Mode to Improve the Learning Outcomes of Fourth Grade Students of UPT SDN Penambangan 3. The research method used is Research and Development (R&D) with the ADDIE model. The feasibility of the media was tested through expert validation. The validation results showed that this media was very feasible to use, with a validation score of 96%, media experts 96%, and language experts 94%. Practicality data was obtained from the results of the student response questionnaire totaling a score of 578 with an average percentage score of 96%, and the results of the teacher response questionnaire obtained a score of 48 with a percentage score of 96%. Effectiveness data from student test results analyzed using the N-Gain score formula, obtained an average result of 0.81. If the percentage figures are converted into effectiveness categories, it can be concluded that the Water Cycle Diorama Media Based on Quizizz Paper Mode falls into the "High" category. Thus, the Water Cycle Diorama Media Based on Quizizz Paper Mode can be used as an alternative effective learning media to improve the learning outcomes of fourth grade students at UPT SDN Penambangan 3.

Keyword: Feasibility of Water Cycle Diorama Media, Quizizz Paper Mode, Learning Outcomes

PRELIMINARY

Education is crucial to community life. With education, every citizen has the right and responsibility to receive formal, informal, and non-formal education (Indy, 2019). According to Angelika et al. (2023), education is an effort to create a learning process and environment that actively develop students' potential to acquire intelligence, self-control, good character, and spirituality. Education is a feedback process between students and educators that involves factors that contribute to the efficient and effective achievement of learning objectives.

Through effective and efficient learning, the teaching and learning process can attract students' interest in learning something in greater depth. Effective means students

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can understand all the topics covered, while efficient means students understand the entire topic with minimal exposure (Adhisa, Pramudita, & Santoso, 2022).

The learning used is the Natural and Social Sciences (IPAS) subject, a combination of the Natural Sciences and Social Sciences subjects, which is one of the developments of the independent curriculum that serves as a single theme in learning. According to Wahyuni (2020), Natural Sciences is a discipline with specific characteristics, namely the factual study of natural phenomena, both in the form of realities and events. "There are three terms that underlie the definition of Natural Sciences: science, knowledge, and nature." It is knowledge obtained through scientific means, resulting in rational, logical, and objective results. Knowledge is everything known to humans. According to Azzahra (2023), Social Sciences is a subject whose discussion is a simplification of geography, sociology, history, economics, and others. It studies, examines, and analyzes social phenomena and problems in society by examining them from various aspects of life or a combination.

Natural and Social Sciences (IPAS) learning examines living and non-living things in the universe and their interactions, and examines human life as both individuals and social beings interacting with their environment. In the Independent Curriculum, this learning aims to develop a more holistic, multidisciplinary, and contextual education. These two subjects are not only studied separately, but are also connected to each other so that students can understand the relationship between natural and social aspects in everyday life (Suhelayanti, Z, & Rahmawati, 2023).

Science learning in schools is student-centered and active, providing a platform for students to explore and understand their surroundings and engage in experimental activities. Therefore, this learning emphasizes hands-on implementation to empower students to explore and understand nature more broadly. Therefore, the science learning process is inseparable from learning media (Fitriani, Suryana, & Zulkarnaen, 2023).

Learning media serves as a tool in the teaching and learning process, facilitating learning and assisting educators in delivering material. As technology advances and becomes more sophisticated, the use of technology aims to simplify daily tasks (Junaidi, 2019). The benefits of learning media include facilitating interaction between students and teachers, stimulating new interests and desires, and stimulating motivation and stimulating learning activities. In addition to stimulating student motivation and interest,

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learning media can also help students improve their understanding and presentation of material and information, thereby improving the learning process and outcomes (Supriyono, 2018).

According to (Firmansyah, Andriani, & Suliswati, 2021), learning media can also direct students' attention, thus fostering learning motivation, which impacts their activeness and learning outcomes. The development of technology and information has led to the development of innovative, effective, and efficient learning media. Therefore, digital-based learning media is needed to improve student learning outcomes.

From observations conducted by researchers on March 14, 2025, it was discovered that students did not fully understand the material and terms used in the water cycle. An interview was conducted with a fourth-grade teacher, Mrs. Meisaroh, S.Pd., SD, regarding the water cycle. There were challenges in the science learning process because the teacher only used student textbooks and did not use learning media for the water cycle material, resulting in a lack of variety. The lack of utilization of learning media is one factor contributing to poor student learning outcomes during the water cycle lesson in science. The number of students in class IV is 13 students, based on the data obtained, there are 75% or 10 students who obtained scores above the KKM and 25% or 3 students who obtained scores below the KKM.

Therefore, in the learning process, teachers should implement learning media and prioritize student active participation, thus creating a conducive learning environment. A possible solution to improve student learning outcomes is to develop interactive learning media to facilitate student understanding of the material presented by the teacher. In this context, the researcher chose to use dioramas. According to Kikiwati (2019), the use of water cycle dioramas is crucial in education. They aim to enhance students' understanding of terms in the water cycle in a more concrete way, particularly those often difficult to grasp. They can also stimulate curiosity about the material being studied. This is because the water cycle is a phenomenon consisting of several processes that cannot be directly seen with the naked eye and are difficult to understand (Kusniawati & Subayani, 2023).

Dioramas are small, three-dimensional images depicting simple phenomena. Dioramas are alternative media that can be used repeatedly to enhance student creativity, thereby making them more active and engaged in learning activities (Fitriani et al., 2023). The advantages of dioramas include their reusability, their ability to depict realistic

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situations, and their ability to show parts of objects that are difficult to see in real life. However, dioramas are generally only suitable for small groups, and some models are difficult to construct and expensive (Christin, Daningsih, & Marlina, 2016).

According to Azizah et al. (2024), the use of dioramas helps convey the concept of the water cycle in greater detail and clarity, which can enhance students' understanding of the process as a whole. Dioramas can also alleviate student boredom during the learning process and reduce teachers' workload, particularly in the context of teaching various topics. Thus, dioramas encourage more active and interactive student engagement in the learning process, including analysis, observation, simulations, and demonstrations.

In the learning process, teachers use conventional methods, namely a teacher-centered learning approach, often employing lectures as the primary means of communication between teacher and students. In this method, teachers tend to play an active role in delivering the material, while students are more passive recipients of information (Iswari, Sunarsih, & Thamrin, 2017). This leads to boredom and hinders students' understanding of the learning material. Therefore, the development of interactive learning media is considered a potential solution to address this challenge (Riyadi & Wibawa, 2024).

One of the interactive media used in this learning process is Quizizz. Its new feature, Quizizz Paper Mode, is very useful for teachers to conduct offline or face-to-face learning. Furthermore, this feature helps students without the need for smartphones, laptops, and internet data, as the teacher acts as the operator (Ni'am et al., 2023). Quizizz Paper Mode is an online game-based digital platform that can be played offline using sheets of paper containing QR Codes (Q-Cards), a two-dimensional barcode or matrix code that is easier to read by scanners and allows for quick communication and response (Rini & Zuhdi, 2021).

The development of a Water Cycle Diorama Media Based on Quizizz Paper Mode aims to provide an engaging alternative learning tool. Through this media, it is hoped that students can follow the learning process in a more enjoyable way, thus making the material easier to understand. Previous research conducted by Seftriana, Wulan, & Hasanah (2020) entitled "Development of Water Cycle Diorama Learning Media in Science Subjects" showed that the developed media was deemed feasible, with validation results from material experts with an overall average of 4.47 and a percentage of 89%, categorized as

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very feasible. Validation by media experts with an overall average of 4.75 and a percentage of 95%, categorized as very feasible. Limited product trials with an overall average of 4.28 and a percentage of 86%, categorized as very feasible.

Furthermore, research conducted by A. S. Wahyuni & Nuvitalia (2024) entitled "Application of Quizizz Paper Mode Media in the Evaluation of Fourth Grade Science Learning at SDN Plamongansari 02" (Implementation of Quizizz Paper Mode Media in the Evaluation of Fourth Grade Science Learning at SDN Plamongansari 02) ... The results of this study indicate that the application of technology as a learning evaluation medium using Quizizz Paper Mode is more effective and practical in evaluation activities, thus further stimulating student interest and motivation.

Based on the description above, the purpose of this study is to develop a water cycle diorama media based on Quizizz Paper Mode that is valid, practical, and effective in improving the learning outcomes of fourth-grade students at the UPT SDN Penambangan 3. The diorama media to be developed is divided into several illustrations of objects at various stages of the water cycle. These include oceans, mountains, land, clouds, the sun, rain, and others. The objects in the diorama will be made realistic, specifically the clouds that drip water, known as rain. The background of the diorama will be painted like a sky, so students will more easily understand and observe what occurs during the rain cycle process if the media is presented in a realistic form. By achieving this research objective, it is hoped that this will produce effective learning media with significant benefits for improving student learning outcomes.

METHOD

This study used the Research and Development (R&D) method. According to Sugiono (2015:407), Research and Development (R&D) is a research method used to produce a specific product and to test its feasibility so that it can be useful and used by the wider community (Shakila, 2020). This development research used the ADDIE development model. According to Aulia et al. (2022), the ADDIE development model consists of five stages: analysis, design, development, implementation, and evaluation. The ADDIE development model was chosen because it describes the process in a simple manner.

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Data collection techniques used a validation sheet to determine the feasibility of the developed media. Validation tests were then conducted with several validators and analyzed using a Likert scale, where the variables were measured and translated into indicator variables. The subjects for the development research were selected based on their competency in their respective fields. Therefore, the media expert validator, Prof. Dr. Agus Wardhono, M.Pd. The material expert validator is Saeful Mizann, M.Pd., and the language expert validator is Dr. Moh. Mu'minin, M.Pd. The analysis of expert validation results to measure product feasibility data can be done using the following formula :

$$ELigibility\ Level = P = \frac{n}{N} x100\ \%$$

Description:

P = Percentage score (%)

n = Total score obtained

N = Maximum number

Table 1. Validity Level Criteria

Precentage (%)	Criteria
100%-76%	Valid
75%-56%	Quite Valid
55%-40%	Less Valid
39%-0%	Not Valid

Source : (Rosidah & Wiratsiwi, 2024)

RESULTS

This research was conducted in several stages prior to its implementation. The researchers first conducted validation to determine the validity of the Quizizz Paper-Mode Water Cycle Diorama Media that had been developed. The validation results for the feasibility of the Quizizz Paper-Mode Water Cycle Diorama Media developed were obtained through quantitative data from validation with several experts. The validation results are as follows:

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1. Material Expert Validation Sheet

Table 2. Results of the Material Expert Validator

No.	Assessment Indicators	Assessment Score
1	The suitability of the Quizizz Paper Mode-based water cycle diorama developed with the Learning Outcomes.	5
2	The suitability of the Quizizz Paper Mode-based water cycle diorama developed with the Learning Objectives.	5
3	The suitability of the Quizizz Paper Mode-based water cycle diorama with the learning material.	5
4	The questions presented in the Quizizz Paper Mode-based water cycle diorama developed are clear and easy for students to understand.	5
5	The Quizizz Paper Mode-based water cycle diorama encourages students' curiosity to learn the material presented.	4
6	The choice of words used is appropriate for the Quizizz Paper Mode-based water cycle diorama material.	5
7	The presentation of the Quizizz Paper Mode-based water cycle diorama material in the learning process can attract students' interest.	4
8	The use of terms in the Quizizz Paper Mode-based water cycle diorama is relevant and appropriate to the water cycle material.	5
9	The material used in the Quizizz Paper Mode-based water cycle diorama is systematically structured.	5
10	The suitability of the questions and material in the Quizizz Paper Mode-based water cycle diorama.	5
Total score obtained		**48**
Percentage score %		**96%**
Criteria		**Valid**

2. Media Expert Validation Sheet

Table 3. Media Expert Validator Results

No.	Assessment Indicators	Assessment Score
1	The Quizizz Paper Mode water cycle diorama can assist teachers in the learning process.	5
2	The Quizizz Paper Mode water cycle diorama developed is easy for teachers to use.	4
3	The Quizizz Paper Mode diorama developed is easy for students to use.	5
4	The Quizizz Paper Mode water cycle diorama's appearance is appropriate for its composition, color, shape, and illustrations.	5
5	The appearance and use of the Quizizz Paper Mode water cycle diorama are easy for students to understand.	5
6	The Quizizz Paper Mode water cycle diorama is durable and resistant to damage.	5
7	The Quizizz Paper Mode water cycle diorama can add variety to the presentation of the material.	5
8	The design of the Quizizz Paper Mode water cycle diorama is tailored to the user's needs.	5
9	The Quizizz Paper Mode water cycle diorama can increase students' enthusiasm for learning.	4
10	The Quizizz Paper Mode water cycle diorama's size is appropriate.	5
Total score obtained		**48**
Percentage score %		**96%**
Criteria		**Valid**

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3. Linguist Validation Sheet

Table 4. Results of the Language Expert Validator

No.	Assessment Indicators	Assessment Score
1	The language used in the Quizizz Paper Mode water cycle diorama is easy to understand.	5
2	The language used in the Quizizz Paper Mode water cycle diorama does not contain any negative elements.	5
3	The language used in the Quizizz Paper Mode water cycle diorama complies with PUEBI (General Guidelines for Indonesian Spelling).	4
4	The language used in the Quizizz Paper Mode water cycle diorama is communicative.	4
5	The language used in the Quizizz Paper Mode water cycle diorama is effective.	5
6	The language used in the Quizizz Paper Mode water cycle diorama is efficient.	5
7	The use of terms and icons in the Quizizz Paper Mode water cycle diorama is easy to understand.	4
8	The language used in the Quizizz Paper Mode water cycle diorama is appropriate for the students' level of understanding.	5
9	The language used in the Quizizz Paper Mode water cycle diorama can enhance students' understanding.	5
10	The choice of grammar in the Quizizz Paper Mode water cycle diorama is appropriate for the students' intellectual level.	5
Total score obtained		**47**
Percentage score %		**94%**
Criteria		**Valid**

Then qualitative data was obtained from comments or suggestions for improvement given by the validators, as follows :

Table 5. Validator Comments and Suggestions

Materials Expert	Reference sources or a bibliography are not included in the guidebook.
Media Expert	More details about the evaporation process are needed.
Linguist	Indonesian language terms should be included in the diorama.

To determine the practicality of the Quizizz Paper Mode-Based Water Cycle Diorama, the researchers administered student and teacher response questionnaires. Based on the questionnaire assessment, it is expected that the Quizizz Paper Mode-Based Water Cycle Diorama will be categorized as "very practical." The average results of the student and teacher response questionnaires are presented in the following table:

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Table 6. Student Response Questionnaire

No.	Student Name	Assessment Score										Total Score
		1	2	3	4	5	6	7	8	9	10	
1	A S A	-	-	-	-	-	-	-	-	-	-	-
2	A Z N	5	5	5	5	5	5	5	5	5	5	**50**
3	D E S	5	5	5	5	5	4	5	5	5	5	**49**
4	D P H	5	5	5	5	5	5	5	5	5	5	**50**
5	G M D A	5	5	5	5	4	5	4	5	5	5	**48**
6	I N I	5	5	5	5	5	5	4	5	4	4	**47**
7	I A M	5	4	5	5	5	5	4	5	3	5	**46**
8	M F D S	5	5	5	5	5	5	5	4	5	4	**48**
9	M N I P	5	5	4	5	4	5	5	4	5	5	**47**
10	O A	5	5	5	5	5	5	4	5	4	5	**48**
11	F A	4	5	5	4	5	5	5	5	5	5	**48**
12	S A F	5	5	5	5	5	4	5	5	5	4	**48**
13	Z P	5	5	5	5	5	5	5	4	5	5	**49**
Total score obtained												**578**
Percentage score %												**96%**
Criteria												**Very Practical**

Table 7. Teacher Response Questionnaire

No.	Assessment Indicators	Assessment Score
1	The suitability of the Quizizz Paper Mode water cycle diorama media for learning objectives	5
2	The suitability of the material presented in the Quizizz Paper Mode water cycle diorama media	5
3	The Quizizz Paper Mode water cycle diorama media can attract students' attention	5
4	The presentation of the Quizizz Paper Mode water cycle diorama media can encourage students to think creatively, actively, and imaginatively	4
5	The color composition, images, and illustrations in the Quizizz Paper Mode water cycle diorama media are appropriate	5
6	The illustrations used in the Quizizz Paper Mode water cycle diorama media are appropriate	5
7	The size of the Quizizz Paper Mode water cycle diorama media is appropriate	5
8	The Quizizz Paper Mode water cycle diorama media can increase students' knowledge about the water cycle	5
9	The Quizizz Paper Mode water cycle diorama media is easy to use	4
10	The pretest and posttest given are appropriate to the material provided	5
Total score obtained		**48**
Percentage score %		**96%**
Criteria		**Very Practical**

Based on the results of the student response questionnaire, a total score of 578 was obtained, with an average score of 96%. The teacher response questionnaire also obtained a total score of 48, with a score of 96%. It can be concluded that the Water Cycle

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Diorama Media Based on the Quizizz Paper Mode developed met the assessment criteria of "very practical" for use in learning. Students were then tested using pre-test and post-test sheets. The student test data was used to assess the effectiveness of the Water Cycle Diorama Media Based on the Quizizz Paper Mode developed. The results of the student test were calculated using the N-Gain formula as follows :

Tabel 8. Hasil Tes Siswa

No	Student Name	Pretest	Post Test	N-Gain score	Category
1	AZN	50	90	0.8	High
2	DES	60	90	0.75	High
3	DPH	40	90	0.83	High
4	GMDA	50	80	0.6	Medium
5	INI	50	100	1.00	High
6	IAM	20	80	0,75	High
7	MFDS	30	90	0.85	High
8	MNIP	50	90	0.8	High
19	OA	40	90	0.83	High
10	FA	40	100	1.00	High
11	SAF	30	90	0.85	High
12	ZP	70	90	0.66	High
	Average	44	90	0.81	Medium

Based on the results of the student test analyzed using the N-Gain score formula, an average result of 0.81 was obtained. If the percentage figures are converted into effectiveness categories, it can be concluded that the Water Cycle Diorama Media Based on Quizizz Paper Mode falls into the "High" category".

DISCUSSION

Based on the validation results with the validators, the feasibility of the Quizizz Paper Mode-based Water Cycle Diorama Media was obtained. The developed product is expected to improve student learning outcomes. The validation scores obtained were 96% from material experts, 96% from media experts, and 94% from language experts, categorized as "valid."

According to previous research conducted by Kusniawati & Subayani (2023), entitled "Development of Diosidro Media (Hydrological Cycle Diorama) in Science for Grade V at SD 272 Wadeng," the results showed that the analysis phase of the hydrological cycle diorama media development was conducted through interviews and

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observations. The Diosidro media was deemed suitable for use based on the expert validation results: material expert 1 obtained a score of 93.3%, material expert 2 obtained a score of 85%, media expert 1 obtained a score of 90%, and media expert 2 obtained a score of 95%, categorized as very valid.

The Quizizz Paper Mode Water Cycle Diorama includes a user manual and instructions, along with explanations of the water cycle process, and the benefits of water for living things. Using Quizizz with the Paper Mode feature is intended to increase student enthusiasm for the learning process. The following image shows the Quizizz Paper Mode Diorama display.

Furthermore, according to research conducted by Rini & Zuhdi (2021), entitled "The Effect of Quizizz Paper Mode on Learning Outcomes of the Application of Pancasila Attitudes for Grade IV at UPT SD Negeri 220 Gresik," the N-Gain test results for grade IV-A were 0.74, categorized as high, while for grade IV-B, the N-Gain test was 0.17, categorized as low. The improvement in learning outcomes in grade IV-A was greater than in grade IV-B. Therefore, Quizizz Paper Mode has a significant impact on learning outcomes in the Application of Pancasila Attitudes for Grade IV at UPT SD Negeri 220 Gresik.

Figure 1. Water Cycle Diorama Media

Figure 2. Using Quizizz Paper Mode

Based on the comments and suggestions provided by the validators, it is hoped that the water cycle diorama media can be more optimal when used in the learning process to improve the learning outcomes of fourth grade students. The following are revisions that need to be made based on the comments and suggestions from the validators.

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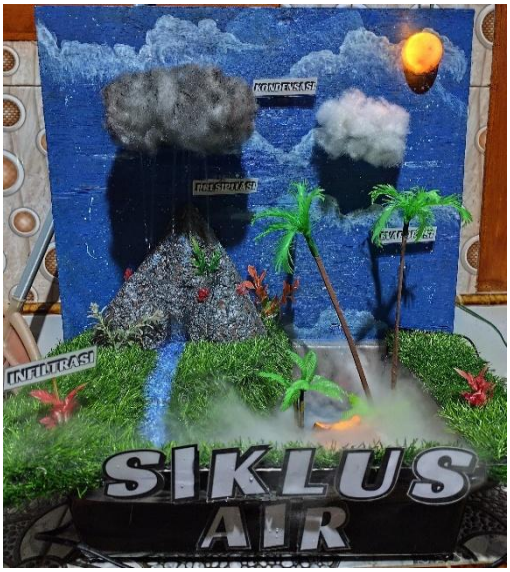
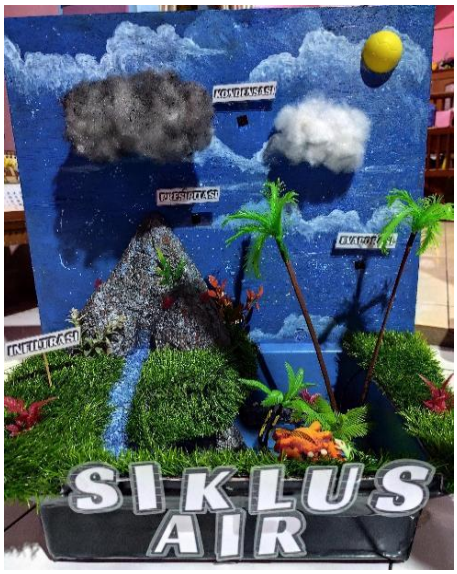
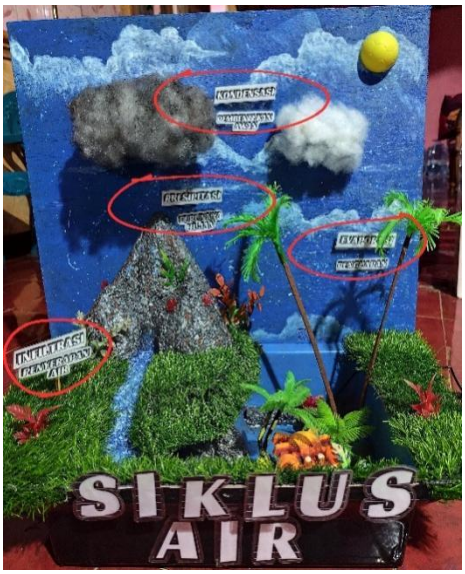
Table 9. Media Revision

No.	Media View (Before Revision)	Media View (After Revision)
1	In the evaporation process, no equipment has been installed for the water evaporation process. 	In the evaporation process, a tool has been installed for the water evaporation process using a mist maker. 
2	Writing the term water cycle process using English. 	The term water cycle process is added to Indonesian according to PUEBI 
3	The guidebook and material summary do not yet have a bibliography	The guidebook and material summary have been supplemented with a bibliography

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CONCLUSION

Based on the research and development conducted, it can be concluded that the feasibility of the Quizizz Paper Mode-based Water Cycle Diorama is highly suitable for use in water cycle learning in fourth grade. The validation scores obtained from material experts were 96%, media experts 96%, and language experts 94%. Practicality data were obtained from the student questionnaire responses, totaling 578 points with an average score of 96%, and from the teacher questionnaire responses, totaling 48 points with an average score of 96%. Effectiveness data from student test results, analyzed using the N-Gain score formula, yielded an average score of 0.81. When the percentage figures are converted into effectiveness categories, it can be concluded that the Quizizz Paper Mode-based Water Cycle Diorama falls into the "High" category. This indicates that the media has met high feasibility criteria in terms of material, media, and language. Thus, the Water Cycle Diorama Media Based on Quizizz Paper Mode can be used as an alternative effective and quality learning media to improve the learning outcomes of fourth grade students at UPT SDN Penambangan 3.

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