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Artikel

DIOSIKLISTER (Interactive Electric Water Cycle Diorama) Learning Innovation to Support Contextual and Enjoyable Science Learning

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ABSTRACT

Some Science concepts are abstract and use less engaging learning media, making it difficult for students to understand the material and resulting in low student learning outcomes. To address this issue, a learning media titled DIOSIKLISTER was developed. DIOSIKLISTER (Interactive Electric Water Cycle Diorama) is an interactive learning medium that integrates the concept of the Water Cycle with simple electrical circuits. The novelty of this innovation lies in the integration of the water cycle and electricity concepts presented in the form of a 3D visual medium. This research aims to develop and determine the feasibility of DIOSIKLISTER in teaching and learning activities. The method used is research and development with the 3D model (define, design, development). In the definition stage, problem analysis was conducted and the product was developed. In the design stage, the product design was created. And in the development stage, feasibility testing was conducted through validation by media experts and material experts. Subsequently, a validation score of 84% was obtained within the score scale interval of 80%-100%, which is categorized as excellent. Thus, the learning media innovation is declared feasible for use. Therefore, it is recommended to implement it in teaching activities to enhance students' understanding.

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INTRODUCTION

Education is a process of changing the attitudes and behavior of an individual or group of people in an effort to mature humans through teaching and training, the process of creating and educating (Magdalena et al., 2023). Meanwhile, according to Ki Hajar Dewantara, education is an effort made by parents towards their children, in providing useful guidance for life, so that the child can achieve perfect happiness in life by using the guidance that has been given (Oktaviana & Ramadhani, 2023). Meanwhile, based on Law Number 20 of 2003 concerning the National Education System, education is defined as a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have religious spiritual strength, self-control, personality, intelligence, noble character, and the skills needed by themselves, society, nation, and state (Faratunnisa et al., 2024). Based on these

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various definitions, it can be concluded that education is a process of changing the attitudes and behavior of individuals or groups in an effort to mature humans through planned and conscious teaching and training.

In the 21st century, the world is undergoing rapid transformation in various aspects that have changed the fundamental social, economic, and educational order. Often, this transformation causes new challenges that are multidimensional, complex, and interrelated, especially in the context of education. This rapid transformation requires education to not only transfer knowledge, but also to serve as a vehicle for developing competencies that are relevant to the needs of the 21st century. Puspa et al. (2023), state that "Education's big goal, preparing students to contribute to the world of work and civic life, has become one of our century's biggest challenges". This statement underlines the dynamics of education, which is no longer oriented towards mastery of material, but rather towards the development of students to participate actively, critically, and responsibly in social, economic, and democratic life.

To overcome these multidimensional challenges, the role of education is crucial because it is the primary means of shaping critical and ethical citizens to face the complexity of global issues. This is as emphasized by UNESCO, which states that "education has a responsibility to be in gear with 21st century challenges and aspirations, and foster the right types of values and skills that will lead to sustainable and inclusive growth, and peaceful living together" (Holst, 2023). This indicates that education must develop 21st-century competencies, known as the 4Cs (Communication, Collaboration, Critical Thinking, and Creativity). It is hoped that these competencies will shape human resources who are competent, adaptive, and able to compete globally.

In Indonesia, the development of 21st century competencies has become the main orientation in national education policy, which is realized in the independent curriculum. This is an effort to respond to global challenges and future human resource needs. This orientation is in line with the educational objectives mandated in Article 3 of Law Number 20 of 2003 concerning the National Education System, which reads "National education serves to develop abilities and shape the character and civilization of a dignified nation in order to educate the nation, with the aim of developing the potential of students to become people who believe in and fear God Almighty, have noble character, are healthy, knowledgeable, skilled, creative, independent, and become democratic and responsible citizens."

The implementation of the independent curriculum, especially in the context of science learning, has complex challenges. This has led to significant disparities or gaps in the quality of education between urban and rural areas, and between areas with adequate infrastructure and disadvantaged, frontier, and outermost (3T) areas. This condition creates disparities in access to quality learning resources and adequate supporting facilities in line with the implementation of 21st-century learning. This is evidenced by the existence of schools in Indonesia that are in poor condition, with limited facilities and infrastructure that can hinder the learning process from being optimal. This reality is not in accordance with Law Number 20 of 2003 concerning the National Education System, article 45, which states that "Every formal and non-formal education unit shall provide facilities and infrastructure that meet educational needs in accordance with the growth and development of the physical, intellectual, social, emotional, and psychological potential of students." This is certainly a concern for the Ministry of Education and Culture , which is specifically tasked by the government with ensuring the equitable distribution of adequate facilities and infrastructure for teaching and learning activities.

In the context of science learning, the independent curriculum encourages the application of active learning methods that are relevant to the real environment and aligned with 21st-century skills. This approach emphasizes mastery of scientific concepts, critical thinking skills, creativity, collaboration, and communication through the exploration of natural phenomena

that are contextual and meaningful to students. According to research from (Fatkhurrohman et al., 2024), it shows that the implementation of learning involves planning, implementation, and evaluation that focuses on flexible open exploration by teachers, so that the implementation of learning can be adapted to local needs and contexts. This learning process does not only focus on mastering the material, but also on developing critical thinking and scientific processes that train students to adapt and innovate to solve real problems.

Teaching methods that are still dominated by a teacher-centered and textual approach are a major obstacle to science education in the 21st century. This approach tends to make students passive, less involved in the learning process, and does not encourage them to develop critical thinking, creativity, and collaboration skills, which are essential competencies for the 21st century. The reality of science learning in schools that still use conventional methods such as lectures is unable to integrate concept mastery, problem solving, and technological skills, which are required by the 21st century curriculum. This is in line with Paulo Freire's criticism that this approach will make students passive, afraid to express their feelings, verbalistic, mentally ill, insecure, uncritical, and unproductive(Kamil & Ratnasari, 2023). This is also supported by the results of research Lusi et al. (2023), which states that conventional learning is considered ineffective because learning is still one-way. This causes science learning in the classroom to be meaningless and lowers student motivation to learn. This is reinforced by the results of the study, which found that 94.7% of students had difficulty understanding the learning material, and 100% of students needed additional teaching materials to help them understand the material.

In addition, the transfer of information and understanding to students is often not done holistically by emphasizing the multidisciplinary integration of natural sciences. Usually, biology, chemistry, and physics are taught separately without any effort to combine the three into a single concept. However, according to States in Roehrig et al. (2021), an interdisciplinary approach through crosscutting concepts is very important for forming comprehensive science literacy. The emphasis on separate concepts causes students to fail to correlate concepts, resulting in fragmented and easily forgotten understanding. Therefore, there is a need for innovative learning methods that emphasize the integration of science concepts. This will enable students to gain an understanding that correlates one discipline with another.

Based on this problem, there is a need to develop learning methods that use innovative media to overcome the limitations of conventional approaches and improve holistic, contextual, and meaningful science learning. Innovative efforts to improve learning effectiveness can be done by providing learning media that is integrated with multidisciplinary science learning. With these problems in mind, we created an integrated teaching aid-based learning media innovation. This learning media innovation is titled DIOSIKLISTER: Integrated Water Cycle Learning Media Innovation with Electrical Circuits to Support Contextual and Enjoyable Science Learning. DIOSIKLISTER is a learning media that utilizes appropriate technology as an interactive learning medium that integrates the concept of the water cycle with simple electrical circuits. In addition, this innovation also explains the process of rain formation in a realistic manner.

This water cycle learning media innovation has a novelty that focuses on a dynamic and interactive water circulation system. Unlike static models that are only mock-ups, this innovation uses a simple circulation pump and mini electrical circuit to move water. With basic materials such as used jerry cans as rivers and hoses, this model can simulate real and continuous water flow. The use of electrical elements not only brings the model to life but also introduces students to basic principles of physics and technology in a practical way. Thus, this innovation creates a kinesthetic and visual learning experience, transforming the abstract concept of the water cycle into a concrete and easily understandable process. This uniqueness makes the model an efficient, creative, and environmentally friendly educational tool.

METHOD

The method used in this study is the Research and Development (R&D) method. According to Sugiyono, Research and Development is a research method used to produce a specific product and assess its effectiveness (Sugiyono, 2024). Meanwhile, according to Richey & Klein in Rahayu et al. (2025), Research and Development is a systematic study of the process of design, development, and evaluation with the aim of building an empirical basis for creating products and non-instructional tools or existing and newly developed models and non-models to encourage learning and non-learning activities. Furthermore, according to Purnama in Waruwu (2024), the definition of Research and Development in education is a type of research aimed at producing products for learning, beginning with needs analysis, product development, product evaluation, revision, and product dissemination. From the various definitions provided by these experts, it can be concluded that Research and Development is a systematic and structured research method with the main objective of producing new products or improving existing products through a series of stages, starting from needs analysis, design, development, testing, evaluation, to product revision.

The R&D model used in this study is the 4D model (Four D Models), which stands for define, design, development, and dissemination, modified into a 3D model (Three D Models). This model was chosen because it was considered most appropriate for the context of the innovation to be developed. The 3D model uses three stages in the product development process. The 3D research process can be seen in Figure 1.

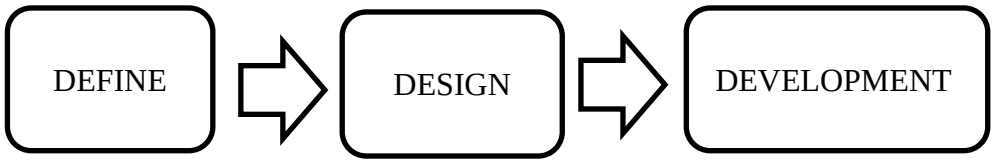

Figure 1. 3D research process

The define stage is the stage of analyzing requirements through analysis of previous research and literature studies. According to Waruwu (2024), there are five steps in this stage, namely:

1. Front-end Analysis :
   Identifying and determining the problems faced in the world of education today.
2. Learner Analysis :
   Identifying the characteristics of learners as the target of learning media development
3. Task Analiysis :
   Identifying the skills that learners must master.
4. Concep Analysis :
   Analyzing the concepts of the material and compiling a rational sequence to be delivered through learning media
5. Specifyng Instructional Objective :
   Determine the learning objectives and behavioral changes of students after acquiring the material.

The next stage is the design stage. There are four steps in this stage, namely:

a. Constructing Criterion-Referenced Test.
   In this step, the researcher develops test standards to be used based on the analysis of learning objectives and student needs.
b. Media Selection
   In this step, the researcher selects the final form of learning media that is effective and relevant to the material.
c. Format Selection

In this step, researchers select the design for developing learning media.

d. Initial design:
In this step, researchers simulate learning materials through teaching

The next stage is development, which is the stage for producing development products and models. At this stage, the media is developed using various simple tools to create attractive visuals in accordance with the material. There are four steps at this stage, namely:

1) Development of material that includes images and visual models of real objects
2) Creating interactive student worksheets to measure student understanding.
3) Media feasibility testing by subject matter experts and media experts.
4) Testing the practicality of the media by developers and supervising lecturers.

The data in this study was obtained in the form of quantitative data. Qualitative data was obtained through validation by two experts, namely subject matter experts and media experts. Subject matter experts are professionals who are experts in a particular field of study or subject. The criteria they must meet are: 1) have a minimum educational background of a bachelor's degree in a particular subject, 2) have worked and been engaged in the field for at least 5 years, 3) not be involved in the process of creating the learning media being assessed, 4) have the commitment and willingness to become a validator without coercion. Media experts are professionals who are experts in specific media and visual communication, with the following criteria: 1) a minimum of a bachelor's degree in media communication, design, or visual communication, 2) Have worked and been engaged in the field for at least 5 years, 3) Not involved in the media production process, 4) Have the commitment and availability to be a validator for learning media standardization (Ahnaf et al., 2021).

The instrument used to collect data is a validation questionnaire that is systematically designed to measure the feasibility of the developed learning media innovation. The validation sheet covers six main aspects, namely material suitability, tool durability, tool accuracy, tool efficiency, aesthetics, and tool safety. The assessment by material experts focuses on the suitability of the tools in relation to the learning materials and learning outcomes. Meanwhile, the media expert's assessment focused on the durability, accuracy, efficiency, aesthetics, and safety of the tools. The assessment approach in this method allows researchers to obtain a holistic picture of the feasibility of learning media innovations, while ensuring that the resulting innovations meet academic standards and usage requirements in the context of 21st-century learning.

Completion of the assessment aspects is presented through an instrument in the form of a checklist table combined with a five-point Likert scale. The scale is designed to measure the level of feasibility and quality of learning media innovations based on the perceptions of experts. This instrument is presented in the following categories:

Very Good	5
Good	4
Fairly Good	3
Not Good	2
Very Poor	1

Next, the results of the validation sheet questionnaire were analyzed using a percentage technique to assess the feasibility of the developed learning media innovation product. This

technique allows researchers to accumulate qualitative assessments from experts into standardized and easily interpretable measures. The mathematical formula used refers to the percentage comparison between the accumulation of empirical scores obtained by respondents and the accumulation of maximum ideal scores, as formulated below:

$$P = \frac{\sum X}{\sum Xi} \times 100\%$$

Explanation:
P = Percentage value
$\sum X$= Total value
$\sum Xi$= Total ideal value

The percentage value obtained from the calculation of the validation score related to material aspects is then interpreted into categories of the extent to which the validity of the material presented determines the extent to which the learning media innovation has been developed. The presentation results are converted into data in accordance with the research conducted by Nadzif et al. (2022), presented in the following table:

Table 1. Criteria for the validity of material aspects

Score	Category
81,25% > Score ≤ 100 %	Highly valid
62, 50% > Score ≤ 81,25%	Valid
43,75% > Score ≤ 62,50%	Sufficiently valid
25% ≥ Score ≤ 43,75 %	Not valid

(source: Nadzif et al., 2022)

The percentage value obtained from the calculation of the validation score related to the media is then interpreted into a feasibility category to determine the extent to which the developed learning media innovation meets academic and technical quality standards. This interpretation refers to the feasibility criteria proposed by Anshori & Sohriati (2024), which divides the value presentation into five categories presented in the following table:

Table 2. Eligibility criteria for media aspects

Interval	Percentage Eligibility Level
80% < NP ≤ 100%	Highly Feasible
60% < NP ≤ 80%	Suitable
40% < NP ≤ 60%	Fairly Suitable
20% < NP ≤ 40%	Less Suitable
NP ≤ 20%	Not Suitable

Explanation:
NP = Percentage Score
(source :Anshori & Sohriati, 2024)

This categorization is used as a basis for decisions regarding the suitability of the developed learning media innovation.

RESULTS AND DISCUSSION

The development of integrated learning media in the form of a water cycle diorama is an innovative effort to overcome the limitations of conventional learning methods in schools, especially in science topics that are often delivered through lecture-based (teacher-centered) methods. Conventional methods such as this, which are still dominant in many Indonesian educational institutions, tend to make students passive and less actively involved in the learning process. As a result, students' understanding of the water cycle concept is limited to theoretical aspects without holistic integration involving observation, exploration, and practical application. The water cycle, as one of the basic concepts of natural science, includes the

interrelated processes of evaporation, condensation, precipitation, and infiltration (Sari et al., 2024). However, lecture methods often fail to demonstrate these dynamic relationships visually and interactively. This makes it difficult for students to understand how the water cycle operates in everyday life. Such as the impact on ecosystems or climate change, so that their understanding is not holistic and lacks meaning. Therefore, this study developed a water cycle diorama as an integrated learning medium designed to encourage a student-centered approach, where students can interact directly with physical models that mimic the natural processes of the water cycle.

The method used in developing this medium is Research and Development (R&D) with a 3D model, which consists of three main stages: Define, Design, and Development. The Define stage begins with identifying learning needs based on literature analysis. Researchers collected data from previous literature studies to understand the main problems, such as the lack of interactive visual media in water cycle learning. This analysis revealed that students often had difficulty visualizing the processes of evaporation and precipitation, so they only memorized definitions without understanding the mechanisms behind them. In addition, conventional teaching materials such as textbooks or blackboards were ineffective for students with visual-kinesthetic learning styles. Based on these findings, the researchers. defined the specifications for the required media, namely a diorama that can show the water cycle regularly using environmentally friendly materials and is easy to operate by students, which they named DIOSIKLISTER.

The Design stage involved conceptual design and initial prototyping of DIOSIKLISTER. Researchers designed a diorama structure made from recycled materials such as plywood, with main components including jerry cans, styrofoam, plastic mica, aerators, mist makers, hoses, ropes s, batteries, LED lights, and waterproof paint. To visualize the sea as the largest water reservoir, used jerry cans were cut in half and small holes were made to allow water to flow into the river. Jerry cans were chosen because they are waterproof and easily obtained from household waste, thus supporting the principle of sustainable learning. The shape of the river was visualized using styrofoam coated with plastic mica, which can hold water well. The styrofoam was designed to twist from the right side of the jerry can to the left side to illustrate the continuous water cycle.

In the evaporation process, a mist maker is used as a steam generator. Steam is produced by inserting the mist maker into the water in the jerrycan, where it rises and undergoes condensation. Meanwhile, for the rain simulation, an aerator is used, which is connected via a hose and has small holes to produce realistic raindrops. The aerator was chosen because it has the ability to systematically pump water from a low place to a high place. The visualization of cloud shapes uses styrofoam that is colored white and gray to depict white clouds that simulate the condensation process and black clouds as a simulation of precipitation, as well as the addition of supporting ornaments such as rice fields, people, trees, and houses made of paper and coated with mica plastic to maintain their durability. This design also integrates interactive elements, such as buttons to activate the cycle, so that students can control the process and observe changes in real time.

The Development stage is the prototype testing and refinement phase. Researchers developed an initial prototype based on the design, then conducted trials to ensure the functionality of the components. For example, testing the mist maker as a water vapor generator and the aerator and hose as water pumps to produce rainwater. The DIOSIKLISTER media was then submitted to subject matter experts and learning media experts to assess its feasibility and effectiveness. The validation instrument was a questionnaire with a 1-5 Likert scale, which assessed aspects such as material suitability, tool durability, tool accuracy, tool efficiency, aesthetics, and tool safety..

The validation result from subject matter experts on the learning media innovation can be seen in the following table:

Table 3. Validation results from subject matter experts

Aspect	Number of Items	Total Score Obtained	Number of ideal scores	Percentage
Material Relevance	3	40	45	89%
Accuracy of tools	2	28	30	93%

` Based on Table 3, there are two main aspects measured, namely material suitability and instrument accuracy, with scores of 89% and 93%, respectively. These results were obtained through 3 material expert validators. This shows that learning media innovation is capable of obtaining high scores.

Table 4. Material validity

Aspect	Percentage	Category
Material suitability	89%	Highly valid
Accuracy of tools	93%	Highly valid

Based on Table 4 on material validation categorization, it shows that the learning media is very valid in presenting material related to the water cycle. This is in accordance with the material validity criteria according to Nurangreini in Nadhifah et al. (2024), a score range of 81.25% score 100% can be categorized as very valid. Thus, quantitatively, it has met the validity standards for the material presented in the learning media. In addition to validating the content aspect, the results of validating the media aspect were obtained. Media Aspect Validation Results The product developed in this study is an interactive learning media for science entitled DIOSIKILISTER on the water cycle, intended for seventh-grade junior high school students. This interactive learning media was assessed by three media experts and material experts who are science teachers. The interactive learning media was assessed to be in accordance with science learning indicators. The results of the validation by media experts can be seen in Table 5 below:

Table 5. Media Expert Validation Results

Aspect	Number of Items	Total Score	Total Ideal Score	Score
Tool Durability	3	35	45	88%
Equipment Efficiency Tool	3	37	45	93%
Appearance Aesthetics	1	13	15	87%
Device Safety	3	38	45	88%

Based on Table 5, there are four main aspects measured, namely tool durability, tool efficiency, tool appearance aesthetics, and tool safety, with scores of 88%, 93%, 87%, and 95%, respectively. These results were obtained through three expert media validators. This shows that learning media innovations are able to obtain high scores.

Table 6. Media validity

Aspect	Score	Category
Durability	88%	Very Good
Equipment Efficiency	93%	Very Good

Tool Aesthetics	87%	Very Good
Device Safety	95%	Very Good

Based on Table 6. Media Validation Results, there are 4 aspects tested, namely tool durability, tool efficiency, tool appearance aesthetics, and tool safety. The results are obtained in the form of percentage scores with a range of 80% < NP ≤ 100%, which is classified as acceptable according to the acceptability scale by (Anshori & Sohriati, 2024). These results are supported by research conducted by (Mayuni et al., 2023) which explains that the criteria for good diorama media design. include good appearance, aesthetics, and safety. It also has acceptable efficiency in its use.

The accumulated presentation from Tables 4 and 6, the validation resi an average score of 84%, which is categorized as valid based on the criteria of Anshori & Sohriati (2024), where scores above 80% are considered very feasible. Subject matter experts gave high scores for the accuracy of the representation of the water cycle, noting that the precipitation process was not only depicted above the sea or lakes but also above the ground or plants, and arrows were added to show the process flow so that students could understand the water cycle by looking at the arrows. Furthermore, the addition of text or scannable barcodes containing explanations of each term in the water cycle flow presented can attract students' interest. Media experts highlighted the interactive and child-friendly design, although there were suggestions to improve the durability of the materials so that they last longer. This validation is important because it ensures that the media is not only innovative but also complies with educational standards, so that it can be implemented widely. Based on feedback, researchers made revisions, such as adding worksheets, material explanations, and instructions for using the media. Overall, the development process ensured that the diorama was not only functional but also educational, with the integration of a complete water cycle concept: evaporation (steam from the mist maker), condensation (clouds above), precipitation (rain from the aerator and hose), and infiltration (water returning to the ground).

Discussion of the development results shows that this water cycle diorama successfully addresses the main problem, namely the lack of holistic understanding among students due to conventional learning methods. With a student-centered approach, this media allows students to interact directly, such as activating steam or spraying rain, which encourages active exploration and experience-based learning. This is in line with Piaget's theory of knowledge construction through interaction, where students build holistic understanding by connecting theoretical concepts, such as evaporation, with physical demonstrations. Compared to lectures, this diorama increases student engagement, as seen in the initial trial where students. were able to explain the water cycle completely after using the media. Additionally, the use of recycled materials not only reduces production costs but also integrates environmental education, allowing students to learn about sustainability alongside science.

The advantage of this medium lies in its multifunctional integration as a visual, interactive, and educational tool. Technically, dioramas are capable of simulating the water cycle cyclically without excessive electricity. This makes them practical for schools in remote, isolated, and disadvantaged areas. Furthermore, BIODIKLISTER will make learning more interesting, learning will be clearer so that it is easier for students to understand, teaching methods will be more varied, and students can do more learning activities such as observing, doing, demonstrating, role-playing, and others. However, there is a limitation in that the rain simulation only occurs in jerry cans. The implication of this research for the world of education is its potential to be replicated in other science topics, such as ecosystems. With a validity of 84%, this media is ready for wider field testing, which is expected to improve the quality of science learning in Indonesia. In addition, the learning media also has shortcomings, namely that it is only an aid, not a substitute for teachers, requires a special room layout, and needs maintenance (Azizurohman et al., 2023). Overall, this development shows that innovations in

media based on recycled materials can be an effective solution to shift the learning paradigm from teacher-centered to student-centered. This enables students to gain a more profound and meaningful holistic understanding.

In the context of related literature, this study is in line with previous studies such as those conducted by Putra (2021), on the development of interactive learning media, which emphasize the importance of expert validation to ensure effectiveness. However, this study is limited to a small scale, so recommendations for further research include testing effectiveness on a larger sample and analyzing the long-term impact on student achievement. Thus, this water cycle diorama not only solves conventional learning problems but also contributes to inclusive and environmentally friendly educational innovation. The researchers hope that these findings will encourage schools to adopt similar media, so that science learning becomes more interesting and effective for the younger generation.

To deepen the analysis, consider the psychological aspect of conventional learning methods, which often cause boredom correlated with low intrinsic motivation in students. This diorama, with its interactive elements, triggers curiosity as described in the theory of self-determination motivation (Marberliantina et al., 2025). Students who are actively involved tend to have higher knowledge retention because they experience the learning process firsthand. For example, when students see steam rising from a kettle and forming clouds. This is different from lectures, where students only listen without interaction. Additionally, the integration of recycled materials teaches environmental ethics, which are rarely covered in conventional methods. From a technical standpoint, development using a three-dimensional model ensures efficiency. The Define stage identified that students in schools need simple media, so the design avoids complex electronic components. The use of jiligen as a water container, due to its high availability and low cost, makes this media accessible. The 84% validation shows strength in the material aspect, but there is room for improvement in the media aspect, such as adding barcodes containing explanations in each process and how to use the media.

Practical implications include the potential adoption in the curriculum where dioramas can be used as a tool in deep learning. Teachers can facilitate group discussions around dioramas that encourage student collaboration. However, implementation challenges include teacher training because not all teachers are familiar with interactive media. Therefore, this study recommends professional development workshops to ensure success. Theoretically, this study reinforces the argument that learning media must be adaptive to student needs. With a focus on holistic understanding, these dioramas integrate cognitive, affective, and psychomotor aspects that are often overlooked in lectures. The high validation results confirm that the R&D approach with 3D models is effective for producing quality educational products. Further research could explore variations in media for other topics, such as using recycled materials for ecosystem models.

CONCLUSION

The development of the DIOSIKLISTER (Interactive Electric Water Cycle Diorama) learning media has successfully produced an innovative learning media suitable for use in science education. Based on the validation results from subject matter experts and media experts, DIOSIKLISTER obtained an average score of 84%, which is classified as highly feasible according to the feasibility criteria of (Anshori & Sohriati, 2024). This media has been proven to be able to integrate the concept of the water cycle with a simple electrical circuit in an interactive and contextual manner, thereby encouraging a paradigm shift in learning from teacher-centered to student-centered. The advantages of DIOSIKLISTER lie in the use of environmentally friendly recycled materials, dynamic water cycle simulations through pumps and aerators, and 3D visualizations that make it easier for students to understand the processes of evaporation, condensation, precipitation, and infiltration holistically. Thus, this media.

effectively overcomes conventional learning problems that tend to be abstract and do not actively involve students.

Further research is recommended to test the effectiveness of DIOSIKLISTER on a larger scale by involving more student samples in various schools, especially in 3T (frontier, outermost, and disadvantaged) areas. In addition, it is necessary to analyze the long-term impact on student learning outcomes and motivation after using this media. The researchers also recommend developing training workshops for teachers so that they can optimize the use of interactive media in learning. The development of similar media for other science subjects, such as ecosystems or the circulatory system, is also necessary to enrich the variety of innovative, contextual, and sustainable learning media based on recycled materials

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