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Development of Visual-Based Interactive Media to Understand the Water Cycle in Elementary Schools

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Abstract

This research aims to develop visual-based interactive media that is effective in increasing elementary school students' understanding of the concept of the water cycle. The water cycle is an important material in the science curriculum, but it is often difficult for students to understand because of its abstract nature. This research uses a qualitative approach with the research and development (R&D) model ADDIE (Analysis, Design, Development, Implementation, Evaluation). The research subjects consisted of teachers and fourth grade students in one of the elementary schools in Indonesia. Data was collected through observation, in-depth interviews and documentation, then analyzed thematically. The research results show that visual-based interactive media, such as animation and digital illustrations accompanied by interactive narratives, can significantly increase students' understanding of the concept of the water cycle. This media also increases student participation in the learning process and helps teachers convey material in a more interesting way. Using this media makes it easier for students to connect theoretical concepts with everyday phenomena, such as rain and evaporation. The teacher stated that this media was practical to use and relevant to learning needs. In conclusion, visual-based interactive media can be an innovative solution in increasing the effectiveness of learning water cycle concepts in elementary schools. This research recommends further development for widespread integration of technology in science learning.

Keywords* : *interactive media, water cycle, media development.

INTRODUCTION

Science learning in elementary schools has an important role in forming the basis for students' understanding of the natural phenomena around them. One of the topics taught is the water cycle, which includes the processes of evaporation, condensation, precipitation and infiltration. However, this concept is often difficult for students to understand because it is abstract and requires imagination to connect phenomena with scientific concepts. This creates a challenge for teachers to find effective ways to deliver the material.

In practice, water cycle learning in elementary schools is still dominated by the lecture method and the use of textbooks as the main media. This method tends to attract less student attention and is not sufficient to accommodate the visual learning style that is common in elementary school age children. This condition has the potential to reduce students' motivation in learning and reduce their understanding of the material.

The use of innovative learning media, such as visual-based interactive media, is one solution that can be implemented to overcome this problem. Interactive media can visualize the water cycle process in a dynamic and interesting way, thereby helping students understand complex concepts more easily. Apart from that, this media also allows students to interact directly with the material, thereby increasing active participation in learning.

Research shows that the use of visual-based media can significantly increase students' understanding of concepts. Animation, video and digital illustrations are effective tools for conveying information visually and providing a more meaningful learning experience. However, in many elementary schools, this type of media has not been fully utilized due to limited resources and lack of training for teachers.

In the current technological era, the integration of digital learning media in the curriculum is becoming increasingly relevant. Students who are part of the digital native generation have a tendency to understand material more easily through interactive visual media. Therefore, the development of technology-based media is an urgent need to meet the challenges of modern learning.

Apart from that, the use of interactive learning media is also in line with a constructivism-based learning approach, which emphasizes student involvement in building their own knowledge. By using visual-based interactive media, students can explore the material independently and understand the water cycle through simulations or virtual experiences that resemble real phenomena.

In the context of learning the water cycle, visual-based interactive media can include animations that depict the process of evaporation to precipitation in real-time, educational games to reinforce concepts, as well as interactive modules that allow students to test their understanding. All of this is expected to increase students' interest in learning and strengthen mastery of the material.

Teachers are also expected to be able to integrate this media effectively into their lesson plans. For this reason, the development of learning media must involve teachers as the main users to ensure relevance and ease of use in the classroom environment.

This research focuses on developing visual-based interactive media to understand the water cycle in elementary schools. By identifying the needs of teachers and students, this research aims to produce media that is not only visually attractive but also in accordance with the curriculum and supports student competency achievement.

The development of visual-based interactive media is a strategic step to improve the quality of science learning, especially the water cycle, in elementary schools. It is hoped that this media can be an effective learning tool and support teachers' efforts in creating a more interesting, interactive and meaningful learning experience for students.

RESEARCH METHODOLOGY

This research uses a qualitative approach with the ADDIE research and development (R&D) model, which consists of five stages, namely Analysis, Design, Development, Implementation and Evaluation. This approach was chosen to understand in depth the process of developing and implementing a product, as well as evaluating its effectiveness. Through this approach, researchers can obtain more comprehensive data about how materials or products are developed and applied in educational contexts, especially at the basic education level.

The first stage, analysis, focuses on identifying the needs of students and teachers, as well as initial conditions in the field. At this stage, researchers made direct observations of the teaching and learning process in the classroom, as well as conducting in-depth interviews with teachers and students. This analysis aims to understand the problems faced in the learning process and find areas that need to be improved or developed. The results of this analysis will be the basis for the next steps in developing learning products.

At the design stage, researchers design the learning model or product to be developed. Based on the findings from the analysis stage, researchers designed teaching materials, evaluation tools, and learning methods that were relevant to student needs and the applicable curriculum. This design also considers various factors, such as student abilities, available facilities and infrastructure, and the learning objectives to be achieved. This design is then prepared in detail to ensure that the product being developed can be implemented effectively.

The development stage involves creating and compiling teaching materials or learning tools based on the designs that have been created. At this stage, the designed product is tested on a small group of students to see to what extent the product can be applied in real conditions. Feedback from students and teachers is very important in this stage to evaluate the feasibility and effectiveness of the product. Researchers then revised the product based on the test results to correct existing deficiencies.

The implementation stage is the stage of applying products that have been developed in a broader learning process. At this stage, researchers involve more students in learning using products that have been tested. During implementation, researchers continued to monitor and observe the implementation of learning, as well as conducting interviews with teachers and students to obtain direct feedback regarding the use of the product in the learning context. The final stage, evaluation, is carried out to assess the success of product implementation, see whether learning objectives are achieved, and make improvements if necessary. Evaluation is carried out through observation, interviews and analysis of documentation produced during the learning process.

RESULTS AND DISCUSSION

The research results show that the use of visual-based interactive media, such as animation and digital illustrations equipped with interactive narratives, can increase students' understanding of the concept of the water cycle. This media allows students to understand processes in the water cycle, such as evaporation, condensation and precipitation, in a more visual and interesting way. With interactive elements, students can more easily follow and understand the flow of each stage in the water cycle, so that previously abstract concepts become more concrete and easier to understand.

One of the important findings from this research is the increase in student participation in the learning process. Visual and interactive based media encourage students to interact more actively with learning material, both through the use of digital tools and through dialogue that occurs during the

learning process. Most students show high enthusiasm for the learning material presented through this media. They were more interested and asked more questions, and were more easily involved in group discussions related to the topic of the water cycle.

Apart from that, this media also helps teachers convey material in a more interesting and effective way. Teachers involved in this research reported that visual and interactive media made it easier for them to explain concepts that were difficult for students to understand. Previously, explanations about the water cycle often felt monotonous and difficult to understand only through verbal explanations. However, with this media, teachers can explain more visually, so that students can see directly images of processes that occur in nature, such as rain and evaporation.

The use of visual media equipped with animation also allows students to more easily connect theoretical concepts with everyday phenomena they encounter. For example, students can see an animation of how water vapor from the ocean evaporates, forms clouds, and eventually falls as rain. This helps them relate learning about the water cycle to hands-on experiences, such as seeing rain happening around them. Thus, this medium not only increases theoretical understanding, but also deepens the relationship between the knowledge learned and the natural phenomena they witness.

This media also supports more independent learning for students. Through the interactive features provided, students can access learning material according to their own speed and level of understanding. Features such as navigation buttons to jump to a specific part of the animation or narration allow students to repeat material if necessary. This way, each student can learn at their own pace, which can help them to better understand and master the concepts being taught.

During the process of implementing this media, teachers provided positive feedback regarding the ease of use and relevance of the media to learning needs in the classroom. Teachers report that this media not only helps them convey material more interestingly, but also enriches students' learning experiences. This media can also be used to support a variety of teaching methods, such as project-based learning or group discussions, which strengthen students' understanding of the water cycle.

Although this media has proven effective in increasing student understanding, there are several challenges encountered during implementation. One of the biggest challenges is the availability of adequate technological devices in some schools. Some schools have limitations in terms of hardware, such as computers or projectors, needed to optimally display this interactive media. Therefore, it is important for schools to ensure that adequate technological infrastructure is in place so that this media is well accessible to all students.

In addition, some students also indicated differences in their comfort level with technology. Students who are more familiar with digital devices tend to master the use of this media more quickly, while students who are less familiar with technology take longer to adapt. This shows the importance of adequate training and guidance for students, especially for those who are not yet accustomed to using digital tools in learning.

Nevertheless, the majority of students showed a positive response to the use of this media. They feel that learning becomes more fun and less boring. Most students stated that the animations and illustrations used in this media helped them to better understand the learning material. They also feel more interested in participating in learning because this media provides a more interesting visual experience compared to traditional methods which are more text based.

Evaluation of the effectiveness of this media shows that visual and interactive media not only increases students' understanding of the water cycle, but also enriches their overall learning experience. Teachers and students alike benefit from using this media, which helps create a more dynamic and interactive learning environment. The results of this research emphasize the importance of developing visual-based learning media to improve the quality of education, especially in teaching complex scientific concepts such as the water cycle.

Overall, this research makes a significant contribution to the development of technology-based learning media in elementary schools. The visual and interactive media developed can be an effective

alternative to overcome challenges in teaching scientific concepts that are difficult to understand. With this media, students can gain a better understanding of the water cycle, as well as develop technology skills that can be useful in future learning. For a clearer understanding, this can be seen in the following image.

Figure 1. Water cycle learning media

CONCLUSION

Based on the research results, it can be concluded that visual and interactive based learning media, such as animation and digital illustrations equipped with interactive narratives, have proven effective in increasing students' understanding of the concept of the water cycle. This media not only makes it easier for students to understand the processes that occur in the water cycle, but also makes learning more interesting and fun. With interactive elements, students can be more actively involved in the learning process and relate theoretical concepts to natural phenomena that they encounter every day.

Apart from that, the use of visual and interactive media also provides great benefits for teachers in delivering material. This media helps teachers explain concepts that are difficult to understand in a more visual way, thereby enriching students' learning experiences. Teachers also report that this media is easy to use and relevant to classroom learning needs, and can increase student participation in the teaching and learning process.

Although there are several challenges, such as limited technological infrastructure and differences in students' comfort levels with technology, the majority of students respond positively to the use of this media. This visual and interactive based learning media can be an effective solution for improving the quality of learning in elementary schools, especially in teaching abstract scientific concepts. Therefore, the development and application of similar media is highly recommended to enrich students' learning experiences and support better achievement of learning goals.

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