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Development of Teaching Props on Water Cycle in Fifth Class Madrasah Ibtidaiyah

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Abstract. The research and development of teaching aids was motivated by the fact that students in class V MIN 1 in Palangka Raya City were faced for the past 2 years with online learning, some of which had an impact on decreasing learning outcomes, lack of student interest in learning, and the need for additional creative teaching aids to arouse students' interest in learning. . Teaching aids are communication tools used by teachers in the learning process. Having valid teaching aids will make it easier for students to understand the material. On the other hand, if the props used are not valid then it will not facilitate understanding for the participants. This development aims to describe the development of teaching aids for class V water cycle material at MI, and to determine the feasibility of the results of developing teaching aids for class V water cycle material at MI. This research is a type of Research and Development (R&D) research that uses the 4-D model. Data collection uses interview, observation, documentation and questionnaire techniques. The final results of this research showed that the validity test of media experts' teaching aids obtained a percentage score of 97.91%, and material experts obtained a percentage score of 98.21%, in the category of very valid and suitable for use. The student response to the results of developing teaching aids was 95.83%.
Keywords. Teaching Materials; Water Cycle; Madrasah Ibtidaiyah

INTRODUCTION

Elementary school level education is initial education in preparing quality human resources, because students have potential that can develop through the learning process (Chanifuddin, 2016). as explained in Law no. 20 of 2003 "Learning is the process of interaction between students and educators and learning resources in a learning environment"(Ministry of National Education, 2003). Thus, students and educators are central figures in the success of the learning process, this is in accordance with what was stated bySofiarini and Rosalina (2021)which states that in the learning process there are two central figures, teachers and students, who collaboratively determine learning materials and objectives, and determine appropriate ways to obtain learning materials and objectives. Based on this, the teacher's task is not only to provide messages about the subject matter, but also to be able to manage the learning as interestingly as possible to facilitate students' understanding of the subject matter (Maulidina and Suryanti, 2019).

Especially for abstract learning materials such as science subjects, because students are more often faced with abstract concepts, lots of foreign terms and scientific names so that not all students can master the expected competencies (Aen, 2020). So, in science subjects, teachers are required to be able to develop and utilize media or teaching aids when the learning process is carried out. This is in accordance with what was stated

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by (Satria and Sari (2018)"More interesting teaching and learning activities require the teacher's ability to use tools in the form of teaching aids with the aim of facilitating the delivery of information and involving students in the process of learning activities."

Facts that have occurred in the field regarding the use of media or teaching aids in the learning process have recently been disrupted because the learning system has changed as a result of the Covid-19 pandemic, including for MIN 1 teachers in Palangka Raya City. In accordance with the conditions faced in recent years due to the Covid-19 virus, teaching and learning activities have been carried out online, which has resulted in some students' learning outcomes decreasing and still appearing to lack enthusiasm for learning so they are lagging behind in the material taught by the teacher. Looking at the student needs analysis questionnaire, as many as 50% of students had difficulty understanding the water cycle material, and 95.7% of students agreed on the water cycle material, researchers developed teaching aids.

Teaching aids that can help the learning process are devices that provide units of knowledge through visual and auditory stimulation (Seprianty, 2018). This is supported by researchMahfud and Nahrowi (2019)Effective teaching aids are teaching aids that are able to improve student learning outcomes. The use of teaching aids also not only influences learning outcomes, as this is supported by researchWahyuningsih (2020)which states that teaching aids can increase students' enthusiasm for learning.

Based on the problems found, researchers are interested in developing a teaching aid that can help with the problems experienced by teachers at MIN 1 Palangka Raya City. This research was carried out with the aim of finding out how to develop teaching aids for class V water cycle material at MIN 1 Palangka Raya City, and how to validate the development of teaching aids for class V water cycle material at MIN 1 Palangka Raya City.

The teaching aids developed by the research have several advantages compared to the water cycle teaching aids usually developed at elementary school level, namely that sound and light elements are added to make the props look closer to the real situation. A number of props or dioramas on the water cycle material have been developed as in research (Putra & Suniasih, 2021)who develops diorama media with similar themes. Some of the water cycle teaching aids that have been made previously are equipped with magnets(Seftriana et al., 2020)and water pump (Afifah et al., 2022) or in other forms such as water cycle media in the form of pop-up books (Ningtiyas et al., 2019).

METHOD

This research uses the type of research and development (R&D). Research and development methods are the methods needed to produce an item, and assess the effectiveness of improving that item (Sugiyono, 2017). In this research, the product is a class V water cycle material demonstration tool, as well as testing the effectiveness of the product produced. This development uses a 4-D model design (four-D model) developed by Thiagarajan (Surtati and Irawan, 2017).

The subjects in this development research are material experts, media experts, teachers and students. The research instruments used were needs analysis

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questionnaires, validation questionnaires, student response questionnaires and observation sheets. The grid of instruments used can be seen in Table 1.

Table 1 Aspects of Feasibility Assessment of Teaching Aids

Subject	Aspect
Media Expert	Display of props
	Suitability of teaching aids to environmental characteristics
	Attractiveness
	Practicality
	Light and sound features
	Durability and security
Materials Expert	Props with learning aspects
	Teaching aids with environmental/student characteristics
	Clarity of teaching aids and material
	Development effects
Student Responses	Display of props
	The quality of the contents of the teaching aids
	Practicality

Thiagrajan (1974) stated that, the abbreviation of research and development steps is called 4-D(Bintari Kartika Sari, 2017).

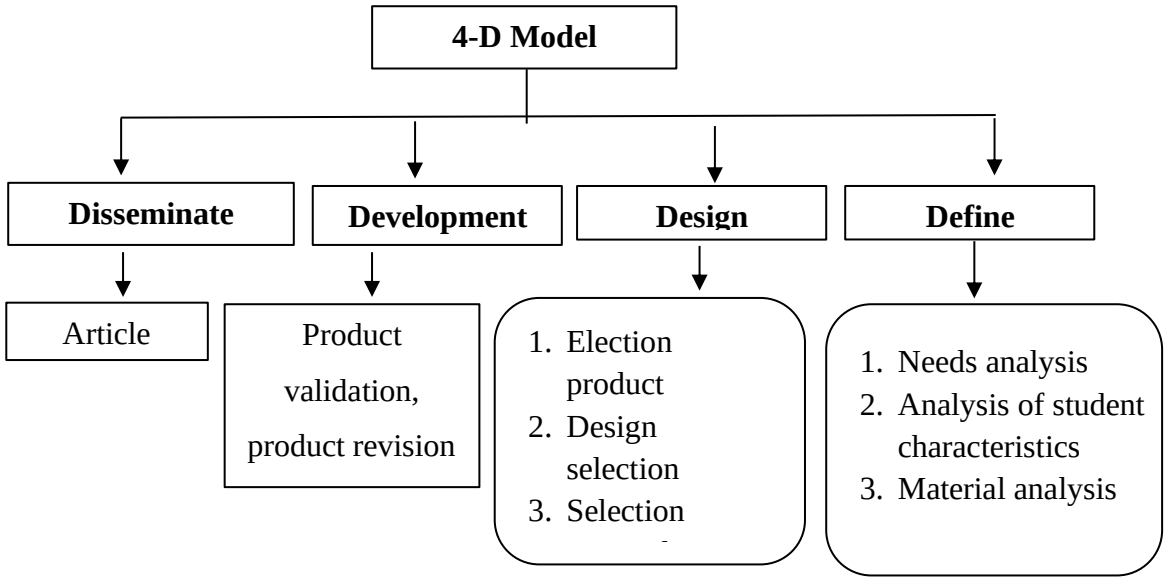

Figure 1. 4D Development Model

Define stage is the stage of seeking information in the field through needs analysis, analysis of student characteristics, and material or curriculum analysis, using observation data collection techniques according to(Shidiq and Choiri 2019)carried out recording and observing problems in the learning process and school conditions, documentation

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according to(Hardani et al., 2020)in the form of notes, drawings or monumental works, interviews according to(Hasen, 2020)in the form of digging up information related to the problem to be researched, and a needs questionnaire according to(Mustafa et al., 2020)in the form of a statement given to the respondent to answer. The next stage is design. This stage creates a design or product design by creating a storyboard, flow chat and determining the materials used. In the third stage of development, researchers began to make teaching aids which would be validated by two validators, media experts and material experts, who aimed to see the validity of the props, using a questionnaire technique which contained statements. The final stage of this model is the dissemination stage, the dissemination stage is carried out to promote the results of the product being developed so that it is accepted by users. Researchers chose the 4-D development model because it is a general learning model and is suitable for research on the development of teaching aids with systematic steps.

The data analysis technique used to measure the validity of the teaching aids is the percentage formula according to (Nuraisyah, 2017)as follows:

$$\text{Percentage} = \frac{\text{skor yang diperoleh}}{\text{skor maksimal}} \; x\; 100\%$$

Validation percentage results: if a score of 0%-50% is obtained then the validation category is invalid, if 51%-70% then the validation category is still not valid, if 71%-85% then the validation category is quite valid, and if the validation results are 86%- 100% then the category is very valid (Prasetiyo and Perwiraningtyas, 2017).

RESULTS AND DISCUSSION

Props Development Process

The first stage definition is carrying out an analysis that aims to explore the needs and interests of students, to determine needs in the learning process (Syar and Sulistyowati, 2021). The needs analysis includes pre-research observations carried out at MIN 1 Palangka Raya City, by interviewing homeroom teachers to find out how the science learning process is, the learning media used, student learning outcomes, and the obstacles educators experience. From observation activities it was found that there were some students who were less active in the learning process. From the documentation, it can be seen that 60% of students experienced a decline in learning outcomes.

Furthermore, a questionnaire was distributed to the needs of class VI students, totaling 116 people, with the aim of finding out what obstacles students experienced in the learning process carried out in the previous semester, finding out what material really needed teaching aids, and what teaching aids students needed in the material. to overcome existing obstacles.

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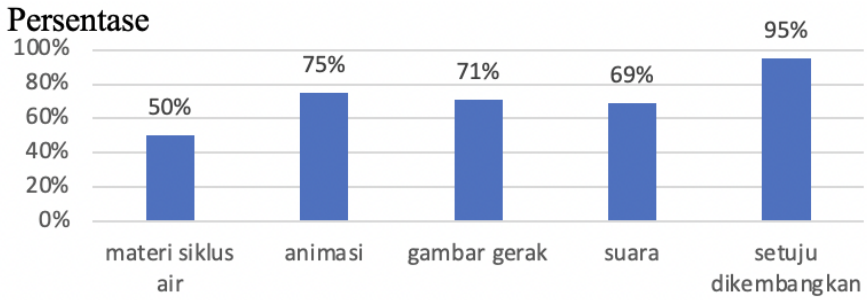

Figure 2. Needs Analysis Questionnaire Data

In Figure 2, 50% or 58 students had difficulty understanding the water cycle material. 75% agree on the water cycle material using animation, 71% agree on using motion pictures on the water cycle material, 69% agree on using sound on the water cycle material. As the solution to the problem above requires props, and as many as 95% of students agree on the cycle material water with the development of props.

Analyzing the characteristics of VC class students. Researchers received information that VC class students tend to have a kinesthetic learning style. It can be seen that in the learning process when the teacher explains the material using only the lecture method, they are less actively involved, some even don't listen, disturb their friends, are not enthusiastic about learning and cannot be quiet. Meanwhile, when the teacher explained by showing his body and using simple tools in the form of spoon props on insulators and conductors, they seemed to pay attention to the teacher's explanation and were enthusiastic about the learning process. This was explained byPrabanitha, Sudarma, and Dibia (2020)that students' kinesthetic learning style will respond well if they learn using media or teaching aids.

At the material analysis stage through reviewing with the VC homeroom teacher and through documentation of my friend's environmental theme 8 book about Core Competencies (KI) 3 and 4 which explains understanding factual, conceptual, procedural and metacognitive knowledge and demonstrating creative, productive thinking and acting skills , critical, independent, collaborative and communicative. Basic Competencies (KD) contained in theme 8 of my friend's environment in class V MI semester 2 KD 3.8 and 4.8.

Second stagedesigning teaching aids for water cycle material which includes designing the concept of determining the manufacturing design. In making the planning, the researcher makes a design which includes a script for developing props consisting of display parts such as miniature images. According to(Kunto et al., 2021)The purpose of design using design plans is to communicate learning content and interaction patterns in a directed manner so as to produce learning media.

At this design stage a number of materials are needed to develop the water cycle teaching aids, the main materials which are safe and strong for the teaching aids are acrylic and Styrofoam. As per(Kiptiyah, Hariyani, and Sholeh (2020)which explains the requirements for props, namely that they be made from safe and resistant materials. The design stage is carried out by creating a st

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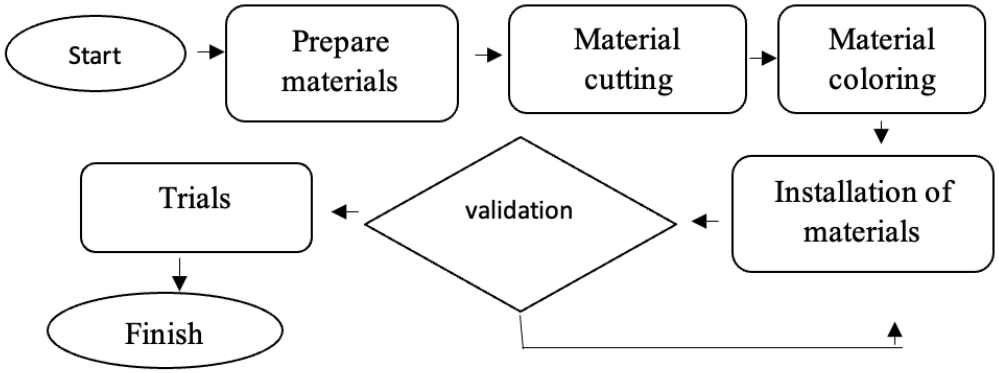

Figure 3. Props Flowchart

Validity of props

Third phase This development is to create and develop props from all the parts that have been provided into a whole that is in accordance with the design of the props that have been previously designed. After the visual aids have been created, instrument validation, media expert validation and material expert validation are carried out to obtain input results and suggestions for improvement and perfection of the product being developed, accompanied by an instrument for assessing the validity of the teaching aids. According to Peprizal and Syar (2020) Validation is carried out by experts because they are experienced in providing assessments and suggestions to improve the quality of the teaching aids being developed. Then carry out product revisions aimed at considering the product before the product is used for trials (Riwanto and Rahayuni, 2018).

The results of media expert validation are presented in table 1.

Table 2. Percentage of Props Development Validation Results

No	Subject	Results(%)	Information
1	First Media Expert	76.61%	Fairly Valid
2	Second Media Expert	97.22%	Very Valid
3	Materials Expert	97.91%	Very Valid

After calculating the average validation percentage, the first media expert got a score of 76.61% in the "fairly valid" category, but still needed improvement and there were comments and suggestions from media experts to improve the product being developed. As explained in the score for each aspect in Figure 4.

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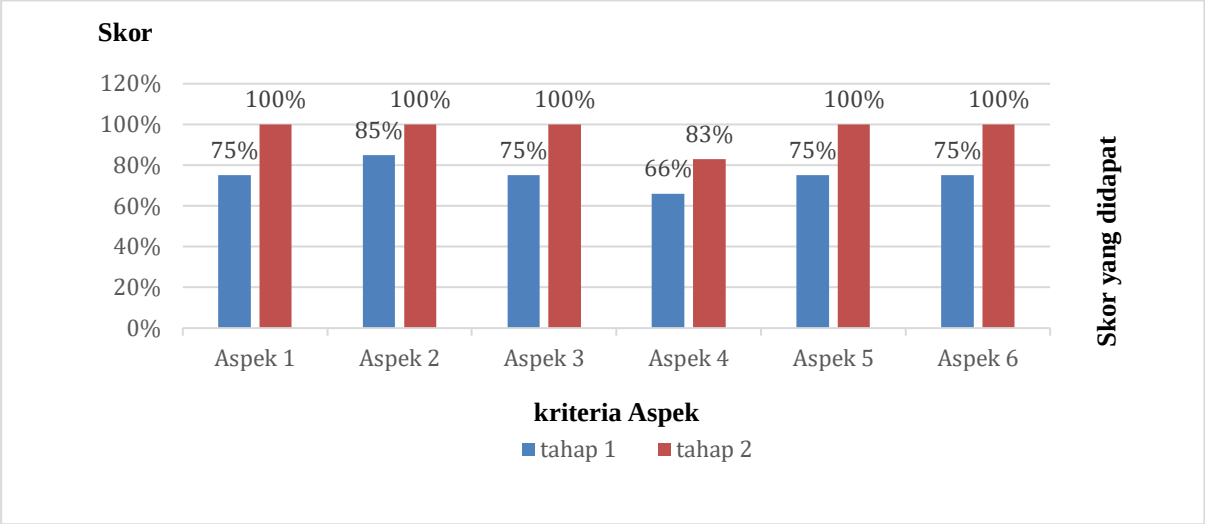

Figure 4. Media Expert Validation Chart

Based on Figure 2, the average percentage score is 97.22% with a very valid category. According to Agung (2017:26) assessment in terms of media appearance which has very valid criteria is very good for use as learning media. According to Setiayani (2021:108) environment-based teaching aids can act as objects of study and learning resources that can make children feel happy in learning. According to Sholiha (2017:42) that interesting teaching aids can be measured by the higher the effectiveness of learning, the more interested students are in the lesson. According to Eliza (2017:15), what is meant by the practicality of a learning media is that it is easy to carry and easy to use. According to Rahmawati (2021:229), light and sound features contribute to the development of good teaching aids, namely paying attention to the gradation of the features used so as not to make things difficult for users. According to Nyomna (2018:178) excellent durability and security of teaching aids can be very useful and in line with what is expected in learning.

However, the practicality aspect of this media received a lower assessment compared to other aspects. This is due to the weight and elements that make up the props which are quite difficult to move repeatedly to distant places.

Based on the results of the validation assessment by material experts, the overall data analysis can be seen in Figure 5.

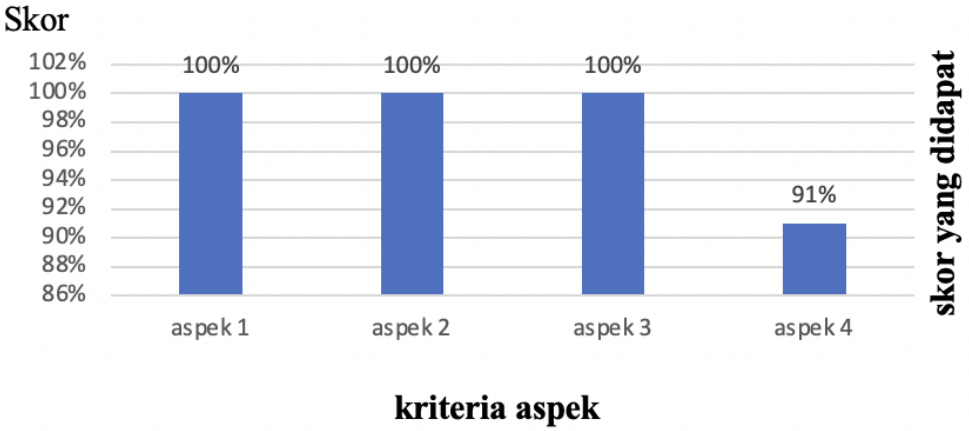

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Figure 5. Validation Chart for Material Expert Teaching Aids

The results shown in Figure 5 show the lack of teaching aids in aspect 4, namely the encompassing development effectincreasing students' knowledge by using teaching aids as teaching materials that can provide enthusiasm for learning. Based on the results of student responses made by 34 students. Testing of students' teaching aids follows the rules that apply in sessions 1 and 2. Students' responses can be seen in Figure 6.

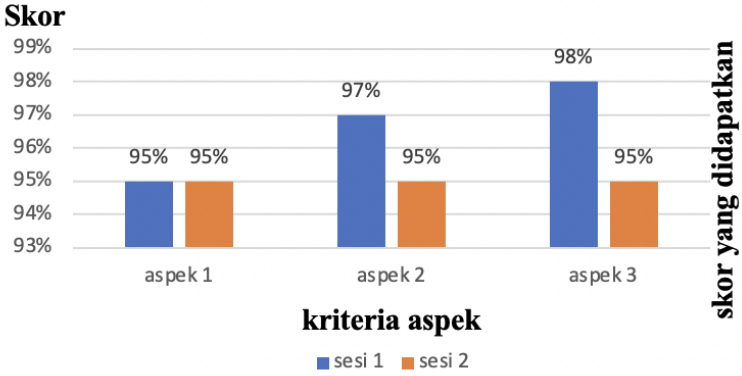

Figure 6. Results of students response

The students' responses showed that the highest aspect was practicality and the lowest aspect was the appearance of the teaching aids. Because there are many features on the props such as LED lights, batteries for audio and water pumps, the display of the props is quite busy and some of them can interfere with the appearance of the props.

According to Firdaus (2019:155) the media or teaching aids used in the learning process must be in accordance with the learning objectives including the material, KI, KD that have been determined, so that media interaction with students will ultimately be able to accelerate understanding to achieve the expected learning objectives. . According to Imam (2020: 152), the teaching aids developed must be in accordance with the activities that students will carry out, because teaching aids are all resources that can be utilized according to the need to establish communication with students. Wahid (2018:3) states that the clarity of the material in learning media proves its superiority in helping teachers convey learning messages more quickly and more easily for students to understand. Referring to previous research on the development of teaching aids carried out by Arini and Lovisia (2019)which states that the validity of teaching aids in the 86-100% category is in the very valid and very good to use category.

Figure 7. Dissemination of Development Products to Schools

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CONCLUSION

Looking at the research results described above, the following conclusions can be drawn: that the development of teaching aids for class V water cycle material in Min 1 Palangka Raya City is valid for use. BeBased on the results of this research, it is said to be valid with the results of material expert validation, namely with an average percentage of 97.91% entering the Very Valid criteria category, media expert validation, namely with an average percentage of 97.22% entering the Very Valid criteria category. The student response to the results of developing teaching aids was 95.83% in the Strongly Agree category. The teaching aids developed are not free from shortcomings, therefore the researcher hopes that in the future he can develop more practical teaching aids and there is a lot of interest from other researchers in developing more creative teaching aids.

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