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Development of Digital Scrapbook Media Based on Problem-Based Learning in an Effort to Increase Learning Motivation and Science Literacy of Elementary School Students

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ABSTRACT

This research aims to determine the feasibility and effectiveness of digital media, specifically digital scrapbooks, based on problem-based learning. The research design used is Research & Development (R&D) research with a 4D development model. The stages carried out are the definition stage (Define), the planning stage (Design), the development stage (Develop), and the dissemination stage (Disseminate). questionnaire, Feasibility Assessment Sheet, and documentation. The data analysis techniques used are feasibility analysis, analysis of scientific literacy questions, analysis of learning motivation, and analysis of student responses. The research results show that the average score for the feasibility assessment is 74.7 in the very good category. Digital scrapbook media is also effective in increasing students' learning motivation with an average score of 42.9. Apart from that, a significant value was obtained for the control class and experimental class after using digital scrapbook media in increasing students' science literacy, namely 0.000 < 0.05. This shows that there are differences in students' scientific literacy abilities before and after implementing learning using digital scrapbook media based on problem-based learning, so it can be concluded that there is a significant influence on the application of digital scrapbook media based on problem-based learning on students' scientific literacy abilities.

Keywords: Scrapbook Digital Media, Problem-Based Learning, Learning Motivation, Scientific Literacy

INTRODUCTION

Literacy is a competency that must be possessed in facing the 21st century era of education. One type of literacy that students must master is scientific literacy. In 21st-century education, students are no longer required to memorize and receive knowledge but also required students to be able to communicate, collaborate, think critically, and be creative (Frydenberg & Andone, 2011; Pratiwi et al., 2019). Scientific literacy is very important for students to be able to understand the environment, health, social issues, and modern and technological issues. Students are also expected to have the competence and skills to be able to use science not only as a concept but also to make science a principle of life by making science a scientific attitude and to be able to use science as problem-solving in real life (Abersek et al., 2015; De Boer, 2000;

Holbrook & Rannikmae, 2009). As stated by Laugksch (2000), there is a strong relationship between scientific literacy and the economic development of a country. This is because a society that is objective, processive, and has capabilities in science will be able to produce reliable scientists and experts, who will ultimately be able to improve the economic level of a country.

Previously, scientific literacy was only defined as "scientific methods" (Rudolph, 2005; Windschitl et al., 2008). However, in 2013 PISA formulated scientific literacy specifications into several competencies, namely: 1) Explaining scientific phenomena. 2) Evaluate and design scientific research and 3) Use scientific evidence. This definition determines the knowledge required in addition to knowledge about content but also knowledge about how to do work and how to interpret knowledge. Students must have all these aspects to be able to solve problems in the real world.

Regarding scientific literacy abilities, PISA (Program for International Student Assessment) states that the scientific literacy abilities of Indonesian students are still low. Indonesia's ranking in PISA is 69th out of 71 countries tested. In Indonesia, scientific literacy skills are still quite low; this is proven by the results of the PISA survey published by Balitbang Kemendikbud in 2016. PISA stated that the average presentation score for Indonesian students was 393 in 2000, scored 395 in 2003, scored 393 in 2006, scored 383 in 2009, scored 382 in 2021, as well as scored 403 in 2015. Meanwhile, the international average score is 500.

The low level of scientific literacy skills in Indonesia is caused by several factors, including 1) textbooks used, 2) learning models, 3) learning media, 4) worksheets, and 5) evaluation tools based on scientific literacy (Rusilowati et al., 2018). This shows that media is one of the things that must be considered in increasing scientific literacy. Another research study conducted by Azimi et al. (2017) stated that science learning media based on scientific literacy is an important factor in increasing scientific literacy.

The results of interviews conducted at several elementary schools in Boja District, Kendal Regency, show that learning media has so far used minimal media. Most of them only use textbooks, and the learning carried out is only lectures so that students' scientific literacy skills and learning motivation are low due to the lack of student involvement in the learning process. Low scientific literacy was also found at SD Negeri 2 Campurejo for 72 class V students; scientific literacy abilities in the content aspect were in the sufficient category with an average test score of 62. This was caused by students' difficulties in understanding scientific phenomena and connecting between concepts. with their application in life. Process aspects include indicators explaining scientific phenomena, using scientific evidence, and evaluating and designing scientific research. The indicator for explaining scientific phenomena is in the sufficient category, the indicator for using scientific evidence is in the quite high category, while the indicator for evaluating and designing scientific research is in the sufficient category. Overall, the process aspect is in the adequate category with an average score of 63. This requires a solution to create innovative learning by utilizing fun media and providing new learning experiences for students.

Learning media is a factor that can provide motivation to students in carrying out learning and is able to encourage students to achieve maximum learning outcomes (Pratiwi, 2018). Students will be successful in understanding the material provided if the learning media used is interesting, thereby increasing students' motivation and interest in learning (Setyadi and Qohar, 2017).

The development of science and technology has given rise to various learning media innovations. One of them is digital learning media, which allows students to learn anywhere and anytime. Digital-based learning media can be an alternative for

teachers to package learning materials to make them more interesting for students. Learning using digital media can facilitate students learning more widely and more variedly. The learning material studied will be more varied, not only text, but also visual, audio, and motion.

Digital technology that penetrates learning media can also take the form of modifications to previously existing media. one of them is a scrapbook. Scrapbooks are books that contain the art of sticking photos or drawings and decorating them into creative works (Rahmawanti et al., 2020). Scrapbooks are effective in making students participate more, be enthusiastic, dare to express opinions in the learning process, and be more enthusiastic in the learning process (Amalina, 2020).

To increase scientific literacy and student motivation, researchers chose to develop a digital scrapbook media based on problem-based learning. With the new experience, namely learning through digital scrapbook media based on problem-based learning, students are expected to be able to increase students' scientific literacy. The use of this media is also expected to increase student learning motivation.

MATERIALS & METHODS

This research is research and development. In developing learning media, a development model is needed that is appropriate to the education system. The media developed refers to the 4D research and development steps in Thiagarajan (1974:5). The steps for 4D research and development are outlined in the following image.

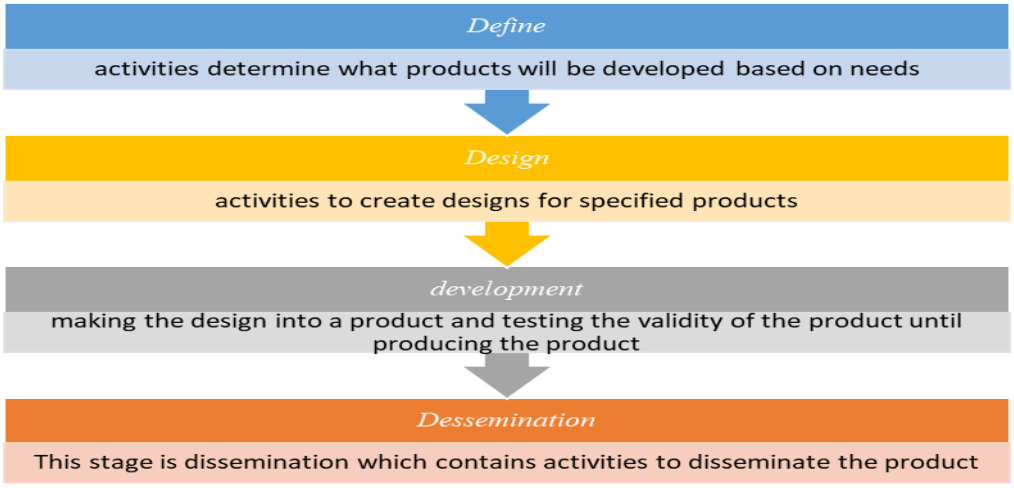

Figure 1. 4D model development design

Data collection instruments are the most important and important tool in obtaining research data. This is because the main aim of research is to obtain data that meets predetermined standards. The data collection instruments used in this research were questionnaires, feasibility assessment sheets, and documentation. The data analysis techniques used are feasibility analysis, analysis of scientific literacy questions, analysis of learning motivation, and analysis of student and teacher responses.

RESULT And DISCUSSION

Development of digital scrapbook media based on problem-based learning Based on the theoretical framework and initial observation results, digital scrapbook media based on problem-based learning was developed based on the goals to be achieved, student characteristics, background or environmental conditions, and the desired coverage area. The goal to be achieved is increasing student learning motivation and creating good scientific literacy, especially in science and science

learning. Characteristics of fifth-grade students with an average age of 11 years with a concrete operational cognitive level. So, when developing media, you must pay attention to the choice of language and illustrations used so that they are clear and easy for students to understand. The display of learning media is presented in the table below.

Table 1 displays digital scrapbook media based on problem-based learning

Name	picture	Information
Cover page		The front cover page contains the title, author's name, and illustrations that match the contents of the book
Instructions for use		The instructions page for using the digital scrapbook uses language and icons that are clear and easy for students to understand
Learning outcomes		Page of learning outcomes and indicators that are expected to be achieved after studying the material in the digital scrapbook.
Material		The main material page begins with a problem and is then followed by presenting material on the water cycle.
Exercises		The practice question page is accompanied by animations according to student answers

bibliography		The bibliography page contains references used in creating the digital scrapbook

Test the feasibility of digital scrapbook media based on problem-based learning. The feasibility of digital scrapbook media based on problem-based learning was validated by three expert validators. Aspects of the feasibility of digital scrapbook media in this research include several things that are described as follows.

Table 2 Results of assessing the feasibility of digital scrapbook media

Number	Aspect	Indicator	Expert Score			Average
			1	2	3	
1	Cover display design	The cover contains the scrapbook's digital identity	4	4	4	4
		Learning media cover designs use images that match the material and readable typeface	4	4	4	4
		The cover colors are attractive and clear	3	4	4	3,6
2	Title display design	The title provides information related to the contents of the digital scrapbook	4	4	4	4
		The letters used are attractive, appropriate size and easy to read	3	4	4	3,6
		The color in the title is attractive, continuous with the color of the cover and clearly visible	3	4	4	3,6
3	Instructions for use	The language used is clear and easy to understand	4	4	4	4
4	Learning outcomes and indicators	Learning outcomes are in accordance with the material	4	4	4	4
		Indicators according to the material	4	4	4	4
5	Material suitability	The material is presented in a complete, comprehensive and in-depth manner in accordance with CP and indicators	4	3	3	3,3
		The material presented is in accordance with library references	4	3	4	3,6
		The material presented is accompanied by appropriate images/photos/videos.	4	3	4	3,6
6	Presentation of material	The material is presented systematically	3	3	4	3,3
		The language used is communicative	3	4	4	3,6
7	Material display design	The letters used are attractive, appropriate size, easy to read	3	4	4	3,6
		The images used support the material, are interesting and clear	4	4	4	4
		The colors used are attractive and do not interfere with the readability of the material	4	4	4	4
8	Supporting information	Supporting information according to the material, interesting, clearly legible	3	4	3	3,3
9	Exercises	The questions are appropriate to the material	4	3	4	3,6
10	Bibliography	The bibliography used is accurate and matches the citations in the digital scrapbook	4	4	4	4
Total score			73	75	78	74,7

Based on table 2, it can be seen that the average score for assessing the suitability of digital scrapbook media is 74.7 in the very good category. These results indicate that digital scrapbook media is feasible and can be used for the next stage of research. The media, which is declared suitable by experts, is in line with research conducted by Sulaiman et al. (2019), which states that the results of the expert validation questionnaire show that the level of achievement of the media can be continued for learning because the material available in the media is suitable for use in learning.

The acceptance of digital scrapbook media based on problem-based learning in fifth-grade elementary school is a development of teaching media in science and science learning, especially in water cycle material. This media development aims to increase students' learning motivation and scientific literacy. Problem-based learning digital scrapbook media trains students' ability to operate digital devices and understand their functions according to the goals to be achieved.

Test the effectiveness of digital media in increasing student learning motivation

The results of the analysis of learning motivation are measured using the following indicators, namely 1) the desire and aspirations to succeed, 2) the encouragement and need to learn, 3) the hope and aspirations for the future, 4) the appreciation for learning, 5) there are interesting activities in learning, and 6) there is a conducive learning environment. Learning motivation is measured using a questionnaire, and then the questionnaire score is presented in the average percentage score. The results of the analysis of student learning motivation after learning using digital scrapbook media based on problem-based learning are presented in Figure 1.

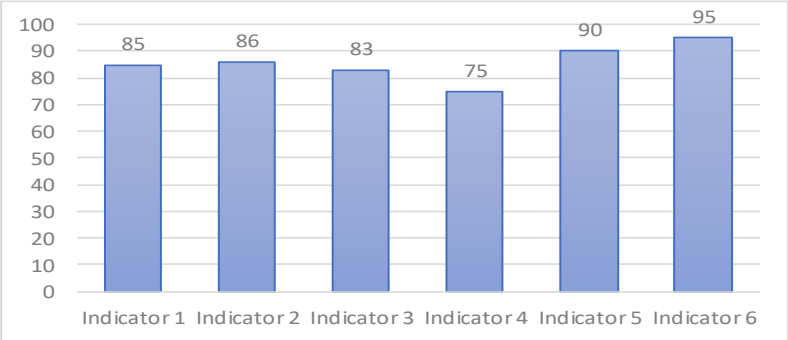

Figure 2. Average score of Learning Motivation for each indicator

Based on the results of the analysis in Figure 2, it is known that the average learning motivation score is 85.6% with a minimum score of 75% and the highest score is 95%, which indicates that students' learning motivation is categorized as very high. Individually, the average score of students' learning motivation can be seen in Table 3 below.

Table 3 Frequency Distribution of Average Scores of Student Learning Motivation

Category	N	%
Low	0	0.00
Currently	0	0.00
Tall	7	28.00
Very high	18	72.00

Table 3 shows that 7 students have learning motivation that is categorized as high, and 18 students are categorized as very high after learning using digital scrapbook media based on problem-based learning. Based on the results of a questionnaire containing indicators of learning motivation, it is

proven that digital scrapbook media based on problem-based learning can increase students' learning motivation. The material about the water cycle is packaged through fun media. Technology-based learning allows teachers to create interactive, efficient, and interesting learning experiences for students (Permana, 2024).

Students use digital scrapbook media to study water cycle material. The material is presented with attractive illustrations, accompanied by sound effects, videos, and interesting information. It is hoped that through this learning, students' learning motivation will increase. This is in line with research by Meilinda (2024), which states that digital book media can increase students' learning motivation because it not only contains text and images but also audio and video.

Test the effectiveness of digital media to improve students' scientific literacy

The pretest and posttest scores obtained for each scientific literacy indicator in the experimental and control classes were then analyzed and categorized into high, medium, and low categories so that the level of effectiveness of implementing learning using digital scrapbook media based on problem-based learning could be known. The results of the pretest and posttest analysis of overall scientific literacy abilities are explained in Figure 3 and Figure 4.

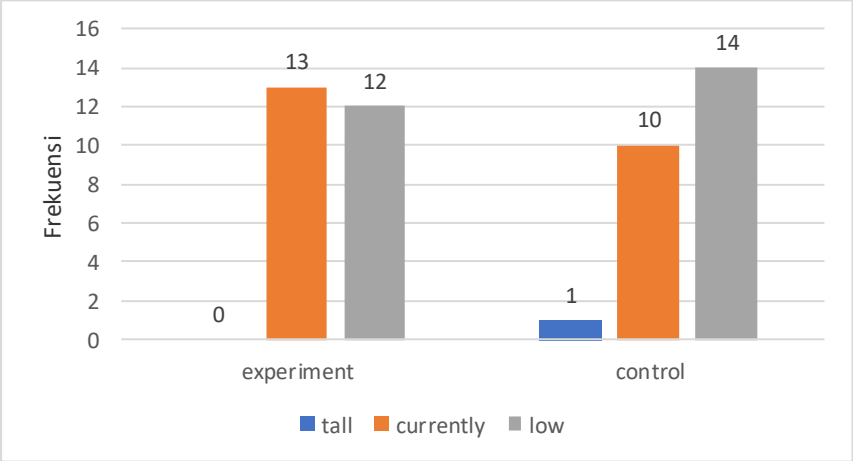

Figure 3. Graph of Pretest Results for Students' Scientific Literacy Ability

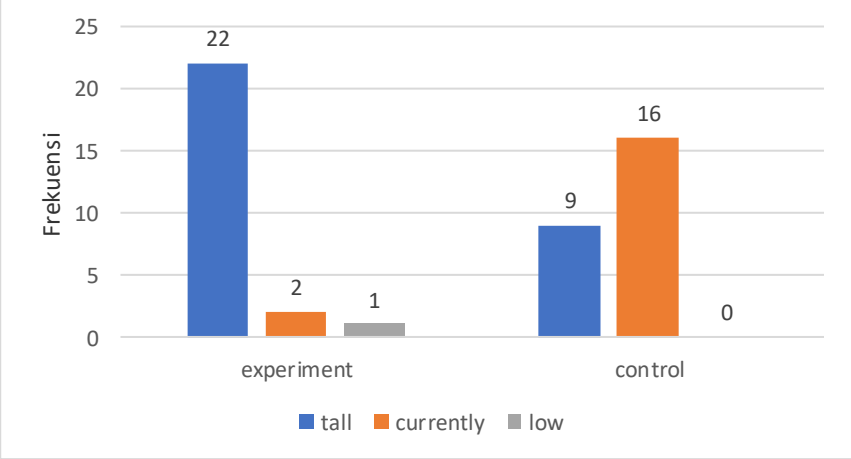

Figure 4. Graph of Posttest Results for Students' Scientific Literacy Ability

Based on graphs 3 and 4, it is known that the scientific literacy abilities of the control class during the pretest were 1 student in the high category, 10 students in the medium

category, and 14 students in the low category. This result increased when the posttest was carried out; namely, 9 students were in the high category, 16 students were in the medium category, and there were no students in the low category. The pretest results of the experimental class showed that 13 students were in the medium category, 12 students were in the low category, and no students were in the high category, while the posttest results showed that 22 students were in the high category, 2 students were in the medium category, and 1 student was in the low category. To find out how the digital scrapbook media influences problem-based learning, testing was carried out using the paired-samples T-Test. The results of the paired-samples T-Test are presented in Table 4 below.

Table 4 Paired-Samples T-Test Test

Data	T-Count	Sig	Conclusion
pre-post control	-9,769	0,00	There is a significant difference
pre-post Experiment	-16,524	0,00	There is a significant difference

Based on the difference test using a paired sample test with a significance level of 0.05 in table 4.5, it was found that the significant value for the control class and experimental class was 0.000 < 0.05. This shows that there are differences in students' scientific literacy abilities before and after implementing learning using digital scrapbook media based on problem-based learning.

The results of the analysis of scientific literacy questions prove that digital scrapbook media based on problem-based learning can increase students' scientific literacy. This is in line with research by Winarni (2020), which states that one way to increase scientific literacy is by using multimedia-based learning media that contain images, audio, video, and so on because it can help students gather more information through various learning experiences that involve five senses to form a broader understanding. Digital media can also make it easier for students to understand abstract material to become more concrete (Ditriguna et al., 2023).

The use of digital scrapbook media based on problem-based learning provokes students' curiosity with the presence of features that can be used according to the instructions for use. This will stimulate students to become motivated and enthusiastic to explore media they have never used before. Problem-based learning digital scrapbook media can make it easier for students to understand the material, stimulate students' thinking abilities and create active and interesting learning for students so that students' scientific literacy will also increase.

Student responses to digital scrapbook media based on problem-based learning

Student responses are measured using a questionnaire, and then the questionnaire scores are presented in the average percentage score. The results of processing student responses can be seen in Table 5

Table 5 Results of Student Response Questionnaire Analysis

Indicator	Score (%)	Category
Enjoyment of using media	86,3	Very good
Ease of using media	85	Very good
Ease of understanding the material	86,7	Very good
The attractiveness of presenting the material	70	Good
Can be used at any time	94	Very good
Can be used anywhere	84	Very good
Can be used for independent learning	86	Very good
Image clarity	91,5	Very good
Text readability	78,5	Very good
Suitability of image to material	67,5	Good
Average	83	Very good

Based on the analysis results in table 5, it can be seen that the average student response score for each indicator is 83% with a minimum score of 67.5% and the highest score is 94%, which indicates that the student response is categorized as very good. This shows that after studying the water cycle material using digital scrapbook media based on problem-based learning, students gave a very good response. Based on the results of the analysis of student responses to the digital scrapbook media based on problem-based learning used in learning water cycle material, it shows very good results. Interactive digital book media can change students' attitudes towards learning science for the better; students become more interested in studying science more deeply and more contextually so that their scientific literacy can increase (Firdausy et al., 2020).

The results of this research show that students responded that the digital scrapbook media developed was fun and easy to use. The material presented becomes more interesting and easier to understand. This digital scrapbook media can also be used anytime and anywhere, so it can be used for independent learning. Digital scrapbooks also contain interesting images, photos, and videos. This is in line with research by Lim (2020), which shows that the use of media with animation, images, and videos in learning is more effective than the use of text and static images.

CONCLUSION

Based on the research results and discussions that have been described, it can be concluded that digital scrapbook media based on problem-based learning is suitable for use as a learning medium. This is proven by the average score for the feasibility assessment being 74.7 in the very good category. Digital scrapbook media is also effective in increasing students' learning motivation with an average score of 42.9. Apart from that, a significant value was obtained for the control class and experimental class after using digital scrapbook media in increasing students' science literacy, namely 0.000 < 0.05. This shows that there are differences in students' scientific literacy abilities before and after implementing learning using digital scrapbook media based on problem-based learning, so it can be concluded that there is a significant influence on the application of digital scrapbook media based on problem-based learning on students' scientific literacy abilities.

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