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DEVELOPMENT OF MICROSITE-BASED LEARNING MEDIA TO IMPROVE SCIENCE LITERACY SKILLS OF ELEMENTARY SCHOOL STUDENTS

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Abstract : *This research aims to develop microsite-based learning media to improve the science literacy skills of IPAS material in grade VI elementary school students. Based on the results released by the OECD in 2023, literacy in Indonesia has increased in rank but has decreased in score. The biggest decline is in the field of science. Facts in the field also show that students' ability in science literacy is still low. This is evidenced by data from the Regional Competency Test conducted in 2024. To overcome this, researchers try to provide alternatives in the form of developing microsite-based learning media to improve the science literacy skills of elementary school students. The research method used is R n D with the ADDIE model. The result is that microsite-based learning media to improve students' literacy skills in elementary school is feasible to use and preferred by students. With a good level of media feasibility, this microsite-based learning media is expected to make a better contribution to learning and can improve the science literacy skills of elementary school students.*

Keywords: *Learning Media, Lietration, Microsite, Science.*

INTRODUCTION

In 2022, Indonesia is again one of the countries participating in the OECD's PISA assessment. In the field of literacy, Indonesia is ranked 59th with a score of 359, only down 12 points from the average global score decline of 18 points. Indonesia also scored 367 in numeracy, down 13 points from the average global score decline of 21 points. Meanwhile, in the field of science, Indonesia is ranked 65th with a score of 383, down 13 points from the average global score decline of 12 points. Based on the results released by the OECD in 2023, despite the decline in scores, Indonesia's ranking has improved. In literacy, Indonesia managed to move up 5 ranks, in numeracy Indonesia rose 5 ranks, and in science Indonesia rose 6 places (Susanto et al., 2024). Based on the data above, it is known that there is an increase in the ranking but there is a decrease in the score. In the field of science, it is known that the decline is higher compared to other fields. This is in line with the facts found on the ground. Data from the results of the Regional Competency Test conducted in the city of Malang, especially at SDN Madyopuro 6, shows that science literacy has not shown the results as expected. The average is still low and needs to be improved. Literacy is a learning process that is carried out comprehensively to identify, understand information, communicate, and calculate using printed and written materials with various contexts (Guru et al., 2022). Meanwhile, science literacy can be described as a person's ability to understand science, communicate science and apply their scientific knowledge to solve problems, so that they can increase attitudes and sensitivity to the surrounding environment (Nurbaya Safar, Indri Makian, 2023).

On what basis, especially among elementary school students, does science literacy skills need to be improved? The goal of science education in the 21st century is to provide students with the knowledge and skills they need to face the challenges of an ever-changing world, and one of the reasons for this is the increasing importance of science literacy in the classroom (Zulfah Rizka Purnama[1], 2024)

Based on the problems that have been presented, the researcher tries to provide a solution by developing a

microsite-based learning media that is attractively packaged. Learning as an activity and the effectiveness of the learning process will be largely determined by its proper planning and operational design. (Salamun et al., 2023). With interesting learning media, it is hoped that students can foster a more active and creative spirit of learning so that the expected learning outcomes can be achieved well. Active learning is expected to explore the abilities of students so that students will obtain optimal learning outcomes (Sulastri et al., 2019). Creativity is also needed in order to build the ideas that students have so that knowledge will continue to be built according to the stages of development. Utama Munandar explained that creativity is "the ability to make new combinations, based on existing data, information or elements" (Oci, 2016). To foster students' activeness and creativity, learning media is needed. Hamka (2018) argues that to increase the effectiveness and efficiency of teaching materials and to arouse students' interest in learning further, educators often use learning media, which can be in the form of physical or non-physical aids (Ani Daniyati et al., 2023). Students can use quizzes, instructional resources, and puzzles in these microsite-based learning resources to hone their science literacy in a fun way. A microsite is an app packed with interactive elements that emphasize teamwork, communication, and engagement. Since the Microsite application is digital and web-based, it can have features that are expected to increase curiosity and motivation to learn (Nurfalah & Rahayu, 2023). Amilia (2022) said that in the results of her research, it was concluded that teachers are required to be able to design relevant teaching materials to help students understand abstract concepts (Suciptaningsih et al., 2025).

We can only hope that science literacy will increase along with a new love for reading and writing. The challenge statement states: How can we develop valid, practical, and effective learning media based on microsites that can improve the science literacy levels of elementary school students? Both educators and students can benefit from the anticipated findings in this study in the form of valid, practical, and successful alternative learning materials that encourage greater engagement and enjoyment in the learning process. Microsite-based learning media has been proven in previous research to attract students' interest in the subject. Students find microsite-based learning resources interesting and effective (Setia Adi, 2023). Microsite-based learning media is suitable for use as a learning tool, according to previous research. Therefore, scientists are interested in proving whether this microsite-based learning media can improve science literacy, especially in elementary schools.

Previous studies have shown that incorporating microsites and other forms of information technology into the classroom has a positive impact on students' learning abilities, especially in terms of Pancasila lessons taught in grade V (Ratna Hayu*, 2024). To improve student learning outcomes, the findings of this study show that microsite-based learning media must be developed. Therefore, research showing the efficacy of microsite-based learning materials in improving the science literacy of elementary school students is needed for this project.

RESEARCH METHODOLOGY

Research and Development (R&D) is the methodology applied to this study. Products that have gone through efficacy and feasibility tests are the expected results of this research strategy. Research and Development (R&D) research techniques are research strategies to create and evaluate an item, as stated by Sugiyono (2011:297) (Okpatrioka Okpatrioka, 2023). The model used is ADDIE. According to Mulyatiningsih (2011), ADDIE is an abbreviation consisting of "Analysis, Design, Development, Implementation, Evaluation" (Junior et al., 2024). This research included observations, interviews, and questionnaires to collect data. The observation was held in the even semester of the 2024/2025 school year at SDN Madyopuro 6 Malang City. A total of thirty-eight sixth graders participated in the study. At the observation stage, the existing problems are analyzed. Students are interviewed to gain a deeper understanding of the challenges, particularly those related to science education, and to assess potential media needs. The media design division conducts an analysis based on the findings of the problem. Researchers at the design stage also design equipment that will be used for data collection. In addition, during development, researchers bring the product to life according to the initial idea. Developed with sixth-graders in mind, this medium leverages content directly related to renewable energy and other core competencies outlined in the school's curriculum. Easy-to-follow instructions, easy-to-understand language, graphics and colors tailored to elementary school children, and font sizes and styles appropriate for sixth-grade elementary school students are all factors that are taken into account during this stage of creation. Engaging visuals, text, video, and audio are part of these educational resources. Once the researcher has finished creating the learning media product, they will validate it with professionals in the field of media and materials. Thus, researchers can determine whether the media they create is effective in facilitating learning. In addition, after receiving feedback from experts, the researcher made adjustments to the product. Offering evaluation tools to media and material specialists allows the implementation of product feasibility studies. Researchers conducted one-on-one interviews with three students to gauge their interests and qualities. Researchers gave questionnaires to six

students as part of a small-group experiment to evaluate the product. Through expert assessment, researchers conducted one-on-one trials and small group trials to ensure product feasibility. The quantitative descriptive statistical data analysis technique is the technique used in this development research. The percentage of each subject's score is calculated using the following formula:

$$x = \times 100\%. \frac{\text{Total Scores of Data Collection Results}}{\text{Number of Question Items x Highest Point Scale Questions}}$$

Decisions regarding the instrument can be based on the explanation of the findings resulting from the calculation of the formula, which will be based on the provisions of the conversion table adjusted from the assessment criteria (Octaviani, 2021).

Table 1. Conversion of Achievement Levels with a Scale of 4

Description	Score	Information
Excellent (SB)	76% -100%	"Very Worthy"
Good (B)	51% -75%	"Worthy"
Pretty Good (CB)	26% -50%	“Less Worthy”
Poor (KB)	0% -25%	"Not Worthy"

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RESULTS AND DISCUSSION

Result

The results of interviews and observations show that students need learning materials that are interesting, simple, informative, and flexible enough to be used independently or with guidance. Therefore, innovative digital learning media is needed. The development stage can begin once the problem and the solution are identified. The development stage is to make the designed media a reality. The following are the results of expert evaluations conducted by both media and content experts before the media was tested on students:

Table 2. Media Expert Validation Results

Aspects	Indicator	Number of Items	Score
Design	**Fit for Purpose:** Whether the microsite design is in accordance with the learning objectives to be achieved?	1	4
	Readability: Whether the text is easy to read with the right font size and good contrast?	1	3
	Navigation: Is navigation intuitive and easy to use?	1	4
	Responsive: Whether the microsite design is responsive and accessible on multiple devices (desktop, tablet, smartphone)?	1	3
	Visual Aesthetics: Is the visual design attractive and in keeping with the theme? What is the harmonious use of colors, images, and graphic elements?	1	3
Content	**Relevance**: Is the content presented relevant to the topic and learning objectives?	1	4
	Quality of Information: Is the information presented accurate, current, and based on reliable sources?	1	4
	Engagement: Is the content of the microsite able to	1	4

	attract attention and engage users? Are there interactive elements?		
	Clarity: Is the information presented clearly and easily understood? Is there enough explanation for each topic?	1	3
	Content Variations: Are there variations in the type of content (text, images, videos, infographics) to support better understanding?	1	3
Display	**Consistency**: Is the microsite look consistent across the page? Do design elements such as colors, fonts, and styles stay the same?	1	4
	Presence of Visual Elements: Are visual elements (images, graphics, videos) used effectively to support content?	1	3
	Loading Time: Does the microsite load quickly? Does loading time affect user experience?	1	3
	Accessibility: Is the microsite accessible to all users, including those with special needs (e.g., alt text for images)?	1	3
	User Feedback: Is there a mechanism to get feedback from users about how and how they use the microsite?	1	3
Total		15	51

$$\text{Calculation Results} = \frac{51}{15\ x\ 4} \text{ x } 100\% = 85\%$$

Table 3. Material Expert Validation Results

Aspects	Indikator	Number of Items	Score
Truth of the Material	The material presented is in accordance with the applicable competency and curriculum standards.	1	4
	The information in the learning media is accurate and free from factual errors.	1	3
Material Completeness	The material covers all the basic competencies required for the learning topic.	1	3
Clarity of Delivery	The presentation of material is not missed or less important for students to understand.	1	3
	The language used is clear, easy to understand by the target students (e.g. elementary school students). Explanations and definitions of concepts are presented in a concise and systematic manner.	1	4
Material Systematics	The material is arranged logically and systematically, ranging from basic concepts to more complex levels.	1	3

	Each piece of material is interrelated and supports the overall understanding.	1	4
Relevance and Context	The material presented is relevant to the needs of students and the context of daily learning.	1	3
	Contoh dan ilustrasi yang digunakan sesuai dengan pengalaman dan lingkungan siswa.	1	3
Difficulty Level Accordingly	The difficulty level of the material is adjusted to the ability and age of the student.	1	4
	The material is not too easy or too complicated so that it can motivate students to learn.	1	4
Proper Use of Scientific Language	The scientific terms used are appropriate and explained if necessary.	1	4
Material Enrichment	The material provides additional information or enrichment to deepen students' understanding.	1	3
	There are additional links or learning resources that can be accessed for further exploration.	1	4
Integration of Thinking Skills	The material encourages the development of students' critical, analytical, and creative thinking skills.	1	4
Suitability of Material Presentation Format	The material is presented in a format that supports comprehension (text, images, videos, graphics) on the microsite	1	4
Total		16	57

$$\text{Calculation Results} = \frac{57}{16\ x\ 4} \text{ x } 100\% = 89\%$$

The results of the recapitulation of the assessment by both media and material experts on the microsite-based learning media products that were developed are as follows:

Table 5. Results of the Expert Review Recapitulation

Expert	Persentase
Media Expert	85%
Material Expert	89%
Average	87%

Based on the data above, the development of learning media was declared feasible by the two experts, then the one-to-one trial was carried out by three students and the small group trial was carried out by six students. The goal is to find out the feasibility of the media developed and the students' interest in this media. The findings of the one to one and small group trials are as follows:

Table 6. Results of One to One Trial

Aspects	Question	Respondent		
		NP	TH	PA
Design	Is the text on the microsite easy to read and not too small?	Yes	Yes	Yes
	Can I find the information I need easily on a microsite?	Yes	Yes	Yes
	Does the microsite design look attractive and fun?	Yes	Quite interesting	Yes
	Is the microsite accessible properly on the device I am using (computer, tablet, or smartphone)?	Yes	Yes	Yes
	Are the elements in the microsite neatly arranged and not confusing.	Yes	Yes	Yes
Material	Whether the material presented is easy to understand and not confusing?	Yes	Yes	Yes
	Does the material include all the information I need to study?	Yes	Yes	Enough to meet
	What is the material presented related to my daily life?	Yes	Yes	Yes
	Is the difficulty level of the material up to my ability?	Yes	Yes	Yes
	Is there any additional information that helps me understand the topic better?	Yes	Yes	Yes
Display	Does the microsite look the same on all pages?	Yes	Yes	Yes
	Are the images and videos used good quality and help me learn?	Yes	Quite helpful	ya
	Apakah microsite memuat dengan cepat dan tidak membuat saya menunggu lama?	Had to wait	Yes	Yes
	Apakah saya dapat mengakses microsite dengan mudah tanpa kesulitan?	Yes	Yes	Yes
	Apakah saya merasa ada cara untuk memberikan pendapat tentang microsite?	Yes	Yes	Yes

After conducting an ine-to-one trial on 3 students, a small group trial will be held next for 6 students.

Table 7. Small Group Trial Results

No.	Respondents	Aspects			Value	%
		Interest	Display	Language		
		7	10	3		
1.	MP	30	35	10	75	93,75
2.	MR	29	34	9	72	90
3.	MA	27	34	12	73	91,25
4.	RP	30	36	7	73	91,25
5.	MK	31	35	9	75	93,75
6.	SA	30	34	11	75	93,75

Average	29,5	34,66	9,66	-	92,28

Calculation Results = $\frac{73,82}{20\ x\ 4}$ = 92,28

Discussion

The results of the evaluation by media experts showed a score of 85%, while material experts obtained a score of 89%. After summarizing the assessments of the two experts, it was found that microsite-based learning media reached an average assessment of 87%. The direct trial showed a positive response from respondents to the design, materials, and appearance of the developed media. The findings of the small group trial showed an assessment of 92.28%. In the context of achieving a scale of 4, the results show that microsite-based learning media to improve the science literacy of elementary school students is feasible. These findings are relevant to previous studies that indicated the effectiveness of microsite-based learning media in improving student learning outcomes. This quantitative data is transformed into qualitative data, indicating that the product meets the criteria very well. Suggestions from experts in the expert review validation test have been integrated to improve the quality of the learning media developed. The conclusions of the direct trial showed students' interest and satisfaction with microsite-based learning media regarding renewable energy, confirming that this medium can be categorized as very good for its use.

CONCLUSION

This microsite-based learning media is suitable for use by students. Materials that are in accordance with the goal of improving science literacy skills are felt to make it easier for students to improve their understanding of science materials that need to be improved.

This research still needs to be developed and further refined so that criticism and suggestions are highly expected by researchers with all their limitations. With the development of microsite-based learning media to improve the science literacy skills of elementary school students, it can be applied as an alternative for teachers in providing innovative and interesting learning media for students. Then for future researchers, it can be applied as a reference material as a basis for better development in the future.

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