

The Development of a Scrapbook Learning Medium to Foster Science Literacy Among Elementary Students



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ABSTRACT

Keywords:

Scrapbook learning media;
science literacy;
Elementary education;
ADDIE model;

This research aimed to develop and evaluate Scrapbook-based learning media to enhance science literacy among fourth-grade students at MI Ma'arif Candran Sleman. The study applied a Research and Development (R&D) approach using the ADDIE model, which consists of five stages: analysis, design, development, implementation, and evaluation. The learning media was created using Canva Pro and validated by material and media experts, as well as classroom teachers. The validation results indicated that the Scrapbook media met the "very feasible" criteria with average scores of 76.9% for material experts, 92.5% for media experts, and 95.6% for teacher responses. The effectiveness of the media was tested using a quasi-experimental design with a nonequivalent control group. Data were collected through pretests and posttests, and analyzed using an independent sample t-test. The findings revealed a significance value of 0.005 (< 0.05), showing a significant difference between the experimental and control groups. The average posttest scores of the experimental group were higher, demonstrating that Scrapbook learning media had a positive and significant effect on improving students' science literacy skills.

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Introduction

Education is a very important part of the progress and sustainability of a nation. For an individual, education serves as a means to develop their potential in academic, non-academic, social, and skill-based aspects. As stated in Law No. 20 of 2003 concerning the National Education System, education is defined as a conscious and planned effort to create a learning environment and learning process in which students actively develop their potential to possess spiritual strength, religious values, self-control, personality, intelligence, noble character, and the skills needed by themselves, society, the nation, and the state.

In the era of the Industrial Revolution 4.0, the importance of scientific literacy in Education 4.0 cannot be overlooked. Scientific literacy helps improve public understanding of natural phenomena, technology, and scientific developments; it trains individuals to make sound decisions, participate in social development, and comprehend global issues such as climate change and health. These scientific literacy skills have become highly relevant to facing daily challenges and advancing careers in an



increasingly complex workforce. The vision and mission of education in the Industrial Revolution 4.0 era no longer focus on overwhelming students with excessive knowledge but rather on providing the necessary skills and understanding required to enter the real world (Karli, 2018). Therefore, integrating scientific literacy into the educational curriculum has become essential to prepare a generation capable of adapting and thriving in the Industrial Revolution 4.0 era.

Scientific literacy is fundamental in preparing future generations to adapt to development and changes over time. It trains individuals to actively contribute to society. The ability of scientific literacy involves utilizing scientific knowledge to identify problems and draw conclusions based on facts, helping individuals understand human interactions with nature and the impacts of daily activities on the environment. According to (OECD, 2003), scientific literacy consists of two words: *literatus*, meaning “being literate,” and *scientia*, meaning “having knowledge.” Scientific literacy is the ability to use scientific knowledge, identify questions, and draw evidence-based conclusions to understand and make decisions related to nature and human activities that alter it. Scientific literacy encompasses the knowledge and understanding of scientific concepts and processes necessary for personal decision-making, participation, and economic productivity (Karli, 2018).

The term “*scientific literacy*” was first introduced by Paul DeHart Hurd in 1958 in an article titled “*Science Literacy: Its Meaning for American Schools*”, and since then, the term has been used to describe an understanding of science and its applications in society (Daniah, 2020). Science education plays an important role in equipping students with the ability to think critically about phenomena occurring around them. Scientific literacy is one of the key indicators of successful science learning, encompassing the ability to understand concepts, analyze information, and make science-based decisions. Unfortunately, many learning processes are still not supported by innovative and engaging learning media. The Scrapbook learning media is one alternative that can provide an enjoyable and contextual learning experience. Therefore, this study aims to develop Scrapbook learning media and examine its feasibility and effectiveness in improving students’ scientific literacy.

Methods

The research method used in this study is Research and Development (R&D). According to (Sugiyono, 2019), the research and development method is a research approach used to produce a product and test its feasibility in the learning process. In this study, the researcher developed a learning product in the form of Scrapbook learning media as a learning tool for fourth-grade students at MI Ma’arif Candran. The development model employed in this research is the ADDIE development model. According to [(Robert Maribe Branch, 2009)], the ADDIE model consists of five stages: analysis, design, development, implementation, and evaluation. In this study, the researcher developed the Scrapbook learning media using the Canva Pro application. The steps of the ADDIE development model applied in this research are as follows Analysis: Analyzing potentials and problems. This stage aims to collect information and determine the appropriate needs for this study. Design: Designing the Scrapbook media that includes science literacy materials. Development: Creating and validating the media by material experts and media experts. Implementation: Testing the media on fourth-grade students at MI Ma’arif Candran. Evaluation: Assessing the effectiveness of the media using pretest and posttest.

The trial in this study used a Quasi-Experimental Design with a Nonequivalent Control Group Design, in which the experimental and control classes were selected randomly. Both classes were given a pretest and a posttest, but received different treatments: the experimental class used the Scrapbook learning media, while the control class used conventional learning media such as student worksheets (LKS) and a blackboard as in typical classroom learning. The subjects of this study were fourth-grade students at MI Ma'arif Candran, Sleman, consisting of two classes with a total of 52 students — 26 students in each class. The classes were randomly assigned, with Class IV A serving as the experimental group and Class IV B as the control group. The feasibility assessment instruments used included material expert validation, media expert validation, and responses from the fourth-grade teacher, which were calculated using a scoring scale based on the Likert scale criteria as follows:

Tabel 1. Kriteria Kelayakan

Rata-rata presentase (%)	Kategori
76-100	Sangat layak
51-75	Layak
26-50	Cukup layak
0-25	Tidak layak

(Saputri & Rahmi, 2024)

Results and Discussion

This research and development study was carried out in several stages to produce a product in the form of Scrapbook Learning Media, which was tested on fourth-grade students of MI Ma'arif Candran Sleman. The purpose of this testing was to determine whether there was a difference in students' science literacy skills based on the IPAS learning material entitled *"How to Obtain All Our Needs"*, particularly under topic A, *"Human Needs Based on Priority"*. The development process employed the ADDIE model, beginning with the analysis stage, which involved observation and interviews with the principal and sixth-grade teacher at MI Ma'arif Candran Sleman. The Scrapbook learning media was designed using the Canva Pro application, featuring visually engaging content related to students' daily lives. The media was developed in the form of a 3D book, created by cutting and assembling printed designs. After realization, the Scrapbook learning media underwent validation by expert validators. Once the product was declared feasible with revisions, the researcher proceeded with the product trial in the experimental class. Implementation in the classroom showed that students became more active, enthusiastic, and demonstrated improved learning outcomes, as indicated by a higher average posttest score compared to the pretest. Thus, the Scrapbook learning media was found to help students better understand the learning material and serve as a creative and engaging learning tool for instruction at MI Ma'arif Candran.

Before product testing, validity tests were conducted to determine the feasibility of the Scrapbook learning media based on the results of material expert validation, media expert validation, and responses from the fourth-grade teacher. The material expert validation in this study included two aspects: content feasibility and language feasibility. The content feasibility aspect consisted of three indicators: the suitability of the material with CP (Capaian Pembelajaran) and TP (Tujuan Pembelajaran), the relevance of the Scrapbook to science literacy indicators, and the learning material.

The language feasibility aspect included three indicators: conformity with students' developmental level, communicativeness, and compliance with the Enhanced Indonesian Spelling System (EYD). Based on the results of the material expert validation, the average score obtained was 76.9%, categorized as *very feasible* with minor revisions, including sentence and punctuation improvements and suggestions to create a pocket book or supplementary booklet to enhance students' understanding. The media expert validation included two aspects: presentation feasibility and supporting item feasibility. The presentation feasibility aspect contained one indicator: presentation technique. The supporting item feasibility aspect included three indicators: size, visual appearance, and image illustration of the Scrapbook.

The results of the media expert validation obtained an average score of 92.5%, categorized as *very feasible*. Meanwhile, the teacher's response yielded an average score of 95.6%, which also met the feasibility criteria under the *very feasible* category. The Scrapbook learning media that had been declared feasible was then implemented in the learning process for Class IV A at MI Ma'arif Candran Sleman. This study employed an experimental approach, with the Scrapbook learning media as the independent variable and students' science literacy ability as the dependent variable. Data were collected through pretests and posttests in essay form, administered to both the experimental class (IV A) and the control class (IV B).

Before use, the test instrument was examined for validity and reliability among fifth-grade students. Out of nine test items, five were declared valid, and the reliability test using Cronbach's Alpha showed a Sig. value of 0.674, indicating that the instrument was reliable since Sig. > 0.6. Subsequently, the Scrapbook learning media underwent large-scale trials with sixth-grade students (Class VI A and VI B), each consisting of 28 students, although only 26 students per class were present during testing. The trials were conducted over three sessions, aligned with the learning module, and concluded with pretests and posttests to evaluate the effectiveness of the media. At the data analysis stage, the researcher tested the pretest and posttest data through several steps. First, the normality test was conducted using the Shapiro-Wilk test, as the total sample size was fewer than 100. The results showed that the data from both the experimental and control classes, in both pretest and posttest, were normally distributed, indicated by significance (Sig.) values greater than 0.05. The results of the normality test analysis are presented as follows:

Table 2. Shapiro-Wilk Test Results

Shapiro-Wilk			
Class		Sig.	Note.
Pretest	Experiment	.054	Normal
	Control	.160	Normal
Posttest	Experiment	.069	Normal
	Control	.125	Normal

Source: Processed data

Next, a homogeneity test was conducted using the Levene Statistic to determine the similarity between groups. The obtained significance value (Sig.) of 0.640 indicated that the data were homogeneous, as the value was greater than 0.05. After fulfilling the requirements of normality and homogeneity, the researcher proceeded to the hypothesis testing using an Independent Sample t-test. The results of the analysis are presented as follows:

Table 3. Results of T-Test Analysis

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Posttest	Sig. (2-tailed)	N	Mean
Experimental Class	0,005	26	81,54
Control Class	0,005	26	70, 58

Source: Processed data

The results of the posttest analysis for the experimental and control classes showed a significance value (Sig. 2-tailed) of 0.005, which is less than 0.05. This indicates a significant difference between the two groups. Furthermore, the average posttest score of students in the experimental class was higher than that of the control class. Therefore, it can be concluded that the use of Scrapbook learning media had a significant effect on improving the science literacy skills of fourth-grade students at MI Ma'arif Candran. Thus, the use of Scrapbook learning media demonstrated a more significant impact compared to the use of student worksheets and traditional blackboard teaching methods

Conclusion

The development of the Scrapbook learning media was carried out following the ADDIE development model procedure, which consists of five stages: Analysis, Design, Development, Implementation, and Evaluation. The Scrapbook learning media was declared feasible as a learning medium for use in the learning process at MI Ma'arif Candran Sleman. Based on the results of the feasibility validation, the material expert validation obtained results categorized as very feasible, and the media expert validation also achieved results categorized as very feasible. In addition, the teacher's response showed results that were also categorized as very feasible. The Scrapbook learning media was tested over three learning sessions in both the experimental and control classes involving sixth-grade students at MI Ma'arif Candran Sleman. The T-test results showed a significance value (Sig.) less than 0.05, indicating a significant difference between the learning outcomes of students in the experimental and control classes. The average posttest score of the experimental class was higher than that of the control class, demonstrating that the use of Scrapbook learning media had a positive and significant effect on improving students' science literacy skills.

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