



# The Effectiveness of E-Scrapbook Media Containing HOTS Questions on Science Learning Outcomes of Elementary School Students

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## ABSTRAK

Rendahnya kemampuan peserta didik Indonesia berkaitan dengan proses pembelajaran IPA yang belum sepenuhnya memberikan kesempatan kepada peserta didik untuk mengembangkan kemampuan bernalar kritis. Penelitian ini bertujuan untuk menganalisis efektivitas media E-Scrapbook bermuatan soal-soal HOTS terhadap hasil belajar siswa kelas IV sekolah dasar. Penelitian ini merupakan penelitian eksperimen dengan menggunakan pendekatan kuantitatif. Desain penelitian yang digunakan pada penelitian ini adalah one group pre-test post-test design. Subjek penelitian ini berjumlah 30 orang siswa kelas IV sekolah dasar. Efektivitas penggunaan media E-Scrapbook Bermuatan Soal HOTS dapat diukur dengan menggunakan metode tes. Metode analisis data yang digunakan dalam penelitian ini adalah analisis deskriptif dan inferensial. Teknik analisis yang digunakan untuk menguji hipotesis adalah Uji-t sampel berkorelasi (Paired Sample T-Test). Pengujian hipotesis menggunakan bantuan program IBM SPSS Statistics for Windows versi 21.0. Terdapat perbedaan yang signifikan hasil belajar IPA peserta didik sebelum dan sesudah mengikuti pembelajaran dengan menggunakan media E-Scrapbook Bermuatan Soal-Soal Berbasis HOTS. Sehingga, penerapan media E-Scrapbook Bermuatan Soal-Soal Berbasis HOTS dalam proses pembelajaran efektif memberikan pengaruh dalam meningkatkan hasil belajar peserta didik.

## ABSTRACT

The low ability of Indonesian students is related to the science learning process which has not fully provided opportunities for students to develop critical reasoning skills. This study aims to analyze the effectiveness of the E-Scrapbook media containing HOTS questions on the learning outcomes of fourth grade elementary school students. This research is an experimental research using a quantitative approach. The research design used in this study was a one group pre-test post-test design. The subjects of this study amounted to 30 elementary school fourth grade students. The effectiveness of using E-Scrapbook media with HOTS questions can be measured using the test method. The data analysis method used in this research is descriptive and inferential analysis. The analytical technique used to test the hypothesis is Paired Sample T-Test. Hypothesis testing using the help of the IBM SPSS Statistics for Windows version 21.0 program. There is a significant difference in the learning outcomes of students' science before and after participating in learning using the E-Scrapbook media containing HOTS-Based Questions. Thus, the application of E-Scrapbook media containing HOTS-based questions in the learning process effectively has an influence in improving student learning outcomes.

## 1. INTRODUCTION

The 21st century learning paradigm focuses on improving character, competence, thinking skills, and literacy (Arifin, 2017; Fityana et al., 2017). Students are expected to be able to solve the problems faced by involving the ability to communicate, collaborate, think critically, creatively, and innovatively in the learning process (Amanah et al., 2017; Selman & Jaedun, 2020). This is in line with the 21st century learning objectives, which are to prepare students to master the skills that will be needed to face the challenges in their lives (Aliftika et al., 2019; Dwyer et al., 2014). 21st century learning is closely related to the development of technology and information (Dewi & Purwanti, 2019; Widodo et al., 2020). Therefore, students are required to master several skills which include learning and innovation skills, mastering media and information technology, as well as life and career skills (Hadkaew & Liewkongstaporn, 2016; Ramdani, 2019). Learning and innovation skills refer to the ability of students to think creatively, problem-solving

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skills, communicate and collaborate, as well as the ability to be creative and innovate. Mastery of media and information technology is intended so that students have the ability to filter and process information, and utilize technology to facilitate their work. Furthermore, life and career skills are related to the ability of students to be adaptive and flexible, independent and initiative, able to interact socially, productively, and have leadership and responsibility. Natural Sciences is a field of science that deals with the description of concepts, principles, and procedures (Riwanto & Wulandari, 2018; Sunarsih et al., 2020). At the basic education level, science is one of the important contents in developing the ability of students to face various challenges in the global era (Widiana, 2016; Wulandari et al., 2020). Therefore, science can be used as an effort to prepare students to have good competencies, science and technology literacy, able to think critically, logically, and creatively, and be able to communicate, collaborate, and argue well and correctly (Irez, 2016; Putri et al., 2019). The competencies expected in science learning, especially in elementary schools, are to provide students with the ability to understand the nature of science, communicate science (both orally and in writing), and apply science skills to solve problems encountered (Bashooir & Supahar, 2018; Fityana et al., 2017). Science learning has implications for students' attitudes and sensitivity to themselves and their environment in making decisions based on scientific considerations.

The low ability of Indonesian students is related to the learning process (especially science learning) which has not fully provided opportunities for students to develop critical reasoning skills. Several previous studies have shown that teachers still have weaknesses in applying learning that is in accordance with science learning (Tias, 2017; Yudiari et al., 2015). The majority of science learning that is carried out is still in the form of science as a product (facts, laws, or theories) that must be memorized which results in aspects of science as scientific attitudes and processes tend to be neglected (Maulida et al., 2020; Wahyu et al., 2020). Furthermore, science learning carried out by teachers has not been fully linked to real-life contexts, meaning that it has not started from actual problems. (Andriyani & Suniasih, 2021; Jundu et al., 2020). Moreover, the act of learning science tends to be only used to prepare students for the exam. In line with various findings from the research that has been described previously, there are indications that science learning that has been implemented so far is still not oriented to 21st century learning and tends to still follow conventional patterns. This has an impact on the low learning outcomes of students. This condition requires efforts to improve the quality of science learning to realize effective learning, especially at the basic education level. In this regard, the learning process should follow international standards and refer to competencies that are relevant to 21st century learning. One form of competence that is in accordance with 21st century learning is the ability to think at a higher level. So learning is needed that is oriented towards literacy, numeracy, and higher order thinking skills (HOTS) students (Johansson, 2020; Pratiwi & Fasha, 2015). This is reinforced by the holding of a National Assessment as a sign of the changing paradigm of educational assessment. The National Assessment has the main objective of encouraging the improvement of the quality of learning and student achievement from cognitive learning outcomes which include literacy, numeracy, and higher-order thinking skills. (Novita et al., 2021; Sudianto & Kisno, 2021). Completion of National Assessment questions requires understanding and high-level thinking skills (Nurjanah, 2021; Rokhim et al., 2021). Therefore, students should be trained in order to develop higher-order thinking skills according to their respective potentials.

Based on the results of interviews with fourth grade elementary school teachers at SD Dwijendra Denpasar, information was obtained that teachers had difficulties in determining the right media for online learning. The teacher stated that there was no learning media that contained questions that could train higher-order thinking skills. They also agreed to develop online learning media containing HOTS questions. One form of media that can be developed based on the results of the needs analysis is E-Scrapbook. E-Scrapbook media is a digital-based learning media in the form of an electronic book (e-book) that contains information or explanations related to learning materials presented with pictures/decorations that can attract the attention of students and make it easier for them to understand the learning material (Antara & Dewantara, 2022; Wusqo et al., 2021). E-Scrapbook learning media can be integrated by including HOTS questions at the end of each learning topic. The use of E-Scrapbook media containing HOTS-based questions can help students train high-level thinking skills. In addition, this media increases students' interest in learning, trains critical and creative thinking skills, and increases students' active participation in learning. In addition, the use of E-Scrapbook media also helps students explore the core of the basic concepts of the material taught by the teacher and stimulates students' curiosity.

Several relevant previous studies have shown that there has been a lot of development of scrapbook learning media as a learning medium which obtain very appropriate assessment results for use in learning. Some of these studies include developing scrapbook media in physics learning (Sari et al., 2019), development of Picture and Picture-based scrapbook media oriented to national insight as an effort to increase national insight for early childhood (Kasdriyanto & Wardana, 2021), as well as study that conducted development of scrapbook learning media based on the Banten cultural context in Social Science

subjects in Elementary Schools (Rosihah & Pamungkas, 2018). The results of these studies indicate that the development and use of scrapbook media is carried out on the consideration that the media can attract students' interest in participating in learning. The increasing interest of students in participating in learning will make a positive contribution in improving student learning outcomes. Based on several studies of relevant research results mentioned above, it can be concluded that e-scrapbooks can be used as practical and innovative learning media in order to improve the quality of learning. The novelty of this research lies in the form of digital-based media, as well as media content that is integrated with HOTS-oriented questions.

This study aims to analyze the effectiveness of the E-Scrapbook media containing HOTS-based questions on the learning outcomes of fourth grade elementary school students. E-Scrapbook media containing HOTS-based questions has an important role to be applied and developed in the learning process. The use of learning media oriented to higher order thinking skills will provide opportunities for students to practice solving problems using higher thinking skills (Hidayat et al., 2019; Pratiwi & Fasha, 2015). The use of interesting learning media is expected to increase the interest and motivation of students to learn. In addition, integrating HOTS questions into learning media is expected to improve student learning outcomes.

## 2. METHODS

This research is experimental research using a quantitative approach. The research design used in this study was a one group pre-test post-test design. Based on this design, research subjects will be given a pre-test before treatment. Furthermore, the research subjects were treated in the form of implementing learning using the E-Scrapbook media containing HOTS-based Questions. The process of developing media products in this study follows the ADDIE development model so that it has implications for the feasibility of the resulting product. The ADDIE development model has systematic stages and allows evaluation activities to occur at each stage (Hendi et al., 2020; Juniari & Putra, 2021). The ADDIE model also allows each stage of development to refer to the previous steps, so that the resulting product is an effective and quality product (Bancin et al., 2019; Suryaningtyas et al., 2020). This ADDIE model consists of five stages that are related to one another, namely from the analysis stage, the design stage, the development stage, the implementation stage to the evaluation stage (Dwiqi et al., 2020; Sholeh, 2019). Thus, a valid and feasible product can be produced. After following the learning process, the research subjects were then given a post-test. This research was conducted in Denpasar City, Bali. The subjects of this study were 30 fourth grade students at SD Dwijendra Denpasar. The effectiveness of using E-Scrapbook media with HOTS-based questions can be measured using the test method. This method is carried out by giving pre-test and post-test to determine the success rate of student learning outcomes before and after the application of the E-Scrapbook media containing HOTS-Based Questions. The grid of instruments used in this study is presented in Table 1.

**Table 1.** Instrument Grid

No.	Basic competencies	Indicators of Competence Achievement	Cognitive Dimension	Number of Questions	
3.4	Analyzing various forces, including: muscle force, electric force, magnetic force, gravitational force, and frictional force.	3.4.1	Determine activities that include encouragement to events in the surrounding environment	C3K2	2
		3.4.2	Analyzing the types of forces with motion on events in the surrounding environment	C4K2	8
		3.4.3	Analyze the factors that affect the motion of objects	C4K2	2
		3.4.4	Determine the effect of a force on the motion of an object on events in the surrounding environment	C3K2	4
		3.4.5	Compare the factors that affect the motion of objects	C5K2	2
		3.4.6	Summarize the factors that affect the motion of objects	C5K2	2
<b>Total</b>				<b>20</b>	

The data analysis method used in this research is descriptive and inferential analysis. The analytical technique used to test the hypothesis is the correlated sample t-test (Paired Sample T-Test). Hypothesis

testing used IBM SPSS Statistics for Windows version 21.0 program. The test is determined by the significance value. This value then determines the decisions taken in the study. If the significance value (2-tailed)  $< 0.05$ , it indicates that there is a significant difference in the students' science learning outcomes before and after participating in learning using the E-Scrapbook containing HOTS-Based Questions. If the significance value (2-tailed)  $> 0.05$ , it means there is no significant difference in the students' science learning outcomes before and after participating in learning using the E-Scrapbook media containing HOTS-Based Questions. Hypothesis testing is preceded by an analysis prerequisite test which includes a test for the normality of the data distribution and a test for the homogeneity of variance.

### 3. RESULT AND DISCUSSION

#### Results

##### Descriptive Analysis Results

The results of the descriptive analysis of the pretest and posttest data in this study are presented in [Table 2](#).

**Table 2.** Descriptive Analysis Results

Statistics	Pretest	Posttest
Mean	59.93	76.96
Median	60.00	77.00
Varians	110.48	95.76
Std. Deviation	10.51	9.78
Minimum	40.00	57.00
Maximum	80.00	97.00

##### Analysis Prerequisite Test Results

Prerequisite tests carried out in this study include tests for normality of data distribution and tests for homogeneity of variance. Based on the results of the analysis of the normality test using the help of the IBM SPSS Statistics 21.0 for Windows program, the significance value (Kolmogorov-Smirnov) for the pretest data is 0.200 and the posttest data is 0.200. Based on these results, it can be seen that the value of Sig.  $> 0.05$  for all data groups. So it can be concluded that the two groups of data are normally distributed. The results of the homogeneity test of data variance in this study using the help of the IBM SPSS Statistics 21.0 for Windows program, showed that the significance value (Based on Mean) was 0.096. Based on these results, it can be seen that the value of Sig.  $> 0.05$ . So it can be concluded that the variance of the data is homogeneous. All analytical requirements related to the Paired Sample T-Test analysis have been met. Analysis of Paired Sample T-Test / Correlated Sample t-test can be used to test the hypothesis of this study.

##### Hypothesis Test Result

Based on the results of the Paired Sample T-Test analysis using the help of the IBM SPSS Statistics 21.0 for Windows program, the significance value (Sig. 2-tailed) was 0.000. Based on these results, it can be seen that the value of Sig.  $< 0.05$ . So it can be concluded that  $H_0$  is rejected and  $H_a$  is accepted. In other words, there are significant differences in the science learning outcomes of students before and after participating in learning using the E-Scrapbook with HOTS-Based Questions. Thus, the use of E-Scrapbook media containing HOTS-based questions is effective in improving student learning outcomes.

##### Discussion

The use of media, e-scrapbooks containing HOTS-based questions can effectively improve the learning outcomes of fourth grade elementary school students. The use of learning media with orientation to higher-order thinking skills provides opportunities for students to practice solving problems using higher-order thinking skills ([Astra et al., 2020](#); [Mardiana & Kuswanto, 2017](#)). The use of interesting learning media can increase students' interest and motivation to learn. In addition, integrating HOTS questions into learning media as training materials can also improve students' higher-order thinking skills. Increased interest, motivation, and higher order thinking skills will directly and indirectly have an impact on improving learning outcomes. The findings of this study are in line with the findings of previous research which states that scrapbook media can attract students' interest in participating in learning ([Kasdriyanto & Wardana, 2021](#); [Wusqo et al., 2021](#)). The increasing interest of students in participating in learning will make a positive contribution in improving student learning outcomes.



The advantage of this learning media compared to similar products lies in the form of media that is already digital-based and contains media content that is integrated with HOTS-oriented questions. Digital-based forms of media make it easy to access media anywhere and anytime. In addition, the use of digital-based media can provide a new atmosphere for students, so that it can increase students' interest and motivation to learn. Furthermore, integrating HOTS-oriented questions in learning media is one of the advantages because current learning demands learning that is oriented to students' literacy, numeracy, and higher order thinking skills (HOTS). The limitations in this study lie in the scope of the material, levels and content of learning developed in the media. The other limitation are number of subjects used in the product effectiveness test. The material developed in the media product in this study was limited to the content of science learning, theme 8 (My Living Area), for the fourth grade of elementary school. While the number of subjects involved in testing the effectiveness of only 1 group (30 people) using the One Group Pre-Test Post-Test research design.

Several relevant previous studies have shown that there has been a lot of development of scrapbook learning media as a learning medium which obtain very appropriate assessment results for use in learning. Some of these studies include developing scrapbook media in physics learning (Sari et al., 2019), development of Picture and Picture-based scrapbook media oriented to national insight as an effort to increase national insight for early childhood (Kasdriyanto & Wardana, 2021), as well as study that conducted development of scrapbook learning media based on the Banten cultural context in Social Science subjects in Elementary Schools (Rosihah & Pamungkas, 2018). The results of these studies indicate that the development and use of scrapbook media is carried out on the consideration that the media can attract students' interest in participating in learning. The increasing interest of students in participating in learning will make a positive contribution in improving student learning outcomes. Based on several studies of relevant research results mentioned above, it can be concluded that e-scrapbooks can be used as practical and innovative learning media in order to improve the quality of learning.

The implications of this research are as follows. First, the e-scrapbook media containing HOTS-based questions in science lesson content for grade IV Elementary School was developed in digital form so that it can be used as a technology-based learning medium to the fullest to support the implementation of learning after the COVID-19 pandemic. In addition, students are given the opportunity to get a more meaningful learning experience and can improve students' technological literacy. Second, the development of e-scrapbook media containing HOTS-based questions in science lesson content for grade IV Elementary School contributes to increasing the number of types of digital-based learning media in which it integrates HOTS-oriented questions. This media product can be used by teachers and students in the learning process, so as to improve the quality of learning outcomes. Third, the use of e-scrapbook media containing HOTS-based questions in science lesson content for grade IV Elementary School in the learning process can indirectly train teachers and students to be able to use technology in learning. Fourth, the e-scrapbook media product containing HOTS-based questions in science lesson content for grade IV Elementary School can be used as a reference in developing similar products as an effort to improve the quality of learning.

#### 4. CONCLUSION

There is a significant difference in the learning outcomes of students' science before and after participating in learning using the E-Scrapbook media containing HOTS-Based Questions. Thus, the application of E-Scrapbook media containing HOTS-based questions in the learning process effectively has an influence in improving student learning outcomes. E-Scrapbook media containing HOTS-based questions has an important role to be applied in the learning process. The use of learning media oriented to higher order thinking skills will provide opportunities for students to practice solving problems using higher thinking skills. The use of interesting learning media can increase students' interest and motivation to learn. In addition, integrating HOTS questions into learning media as training materials is also expected to improve students' higher-order thinking skills. Improvement of interest, motivation, and higher-order thinking skills will directly and indirectly have an impact on improving learning outcomes.

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