

DEVELOPING A 3D PAGE FLIP E-BOOK BASED ON SCIENCE LITERACY INTEGRATED WITH ISLAMIC VALUES FOR FIFTH-GRADE STUDENTS

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ABSTRACT

In line with the swift development of technology in learning, textbooks appear to meet the need for fast and accessible information in the form of electronic books, better known as e-books. This study, therefore, aims to develop a 3D page flip e-book based on science literacy integrated with Islamic values for fifth-grade students. This study's samples were Islamic Elementary School Miftahul Huda 02 Dawe Kudus and Islamic Elementary School (MI/Madrasah Ibtidaiyah) Al Huda Kunduran Blora. Data collection techniques used tests, interviews, documentation, and questionnaires. This study's results were in the form of the characteristics of teaching materials for 3D page flip e-books based on scientific literacy integrated with Islamic values, including aspects of science as the body of knowledge, science as a way to investigate, science as a way of thinking, aspects of the interaction between science, technology, society, and Islamic values. The validity of the 3D page flip e-book teaching materials based on scientific literacy integrated with Islamic values was tested and resulted in very valid criteria. Based on the research results, the validity level of teaching materials obtained a mean of 85.28%, so teaching materials were categorized as very valid. Thus, teaching materials for 3D page flip e-books based on scientific literacy integrated with Islamic values effectively improved students' scientific literacy skills. Then, the similarity test of the two means revealed that the experimental class had a higher increase in cognitive learning outcomes than the control class. The implications of this research include that 3D page flip e-book teaching materials can be used as one of the innovations; developed learning can be used as a teaching tool in the learning process; assisting students in learning the 2013 curriculum can be carried out by implementing scientific literacy-based e-book teaching materials integrated with Islamic values; the availability of e-books as learning media can increase scientific literacy; students can understand science concepts and processes to apply them in everyday life with integrated Islamic values.

Keywords: E-Book Development; 3D Page Flip; elementary school; integration of islamic values; scientific literacy

INTRODUCTION

Education in Indonesia is one of the main focuses that must be optimized and improved. Nevertheless, the quality of education, especially in Indonesia, is still low compared to other countries in terms of literacy. It is evident in the learning outcomes in the Trends in International Mathematics and Science Study (TIMSS). Indonesia's participation in the event exposes that the achievements of Indonesian children are not encouraging in several reports issued and are generally at the lowest stage (low international benchmark). On the other side, under the 2013 curriculum, graduates in elementary or Islamic elementary schools (SD or MI) should be competent in three



aspects: attitudes, knowledge, and skills. Meanwhile, the scientific literacy framework developed by the Organization for Economic Co-operation and Development (OECD) 2016 proposes four assessment aspects: context, knowledge, competence, and attitude. Consequently, scientific literacy aligns with and supports the 2013 curriculum implementation.

Scientific literacy is the ability to understand scientific processes and engage meaningfully with scientific information available in everyday life¹. According to the Program for International Student Assessment (PISA), scientific literacy is defined as the ability to use science and knowledge to identify questions and draw evidence-based conclusions to understand and help make decisions about nature and change through human activities². Scientific literacy is also vital to be mastered by students concerning how they view the environment, health, economy, and the problems of modern society more dependent on technology and scientific progress and development³.

Traced back, the scientific development results from the civilization of Muslims who care about science so that a good understanding of Islamic values can be used as a guide for humans in carrying out their activities. Further, Islamic education's essence includes transferring values and knowledge to optimize all human potential⁴. In this regard, *Al-Quran*, as a guide to the life of Muslims (the source of all knowledge sources), stimulates scientific development.⁵

The framework developed by the Organization for Economic Co-operation and Development (OECD) 2016 regarding integrating scientific literacy with religious values can influence public awareness in using and utilizing science and technology⁶. Therefore, learning methods are needed to prepare students to have good competencies, be literate

¹ Helenrose Fives et al., "Developing a Measure of Scientific Literacy for Middle School Students," *Science Education* 98, no. 4 (2014): 549–80, <https://doi.org/10.1002/sce.21115>.

² Margaret Dwi Wiwik Ernawati et al., "Analysis On Students' Scientific Literacy of Newton's Law and Motion System in Living Things," *Jurnal Pendidikan Sains Indonesia* 9, no. 1 (2021): 36–51, <https://doi.org/10.24815/jpsi.v9i1.18470>.

³ Ani Rusilowati et al., "Developing an Instrument of Scientific Literacy Assessment on the Cycle Theme," *International Journal of Environmental and Science Education* 11, no. 12 (2016): 5718–27.

⁴ Suyadi Suyadi, "Hybridization of Islamic Education and Neuroscience: Transdisciplinary Studies of 'Aql in the Quran and the Brain in Neuroscience," *Dinamika Ilmu* 19, no. 2 (2019): 237–49, <https://doi.org/10.21093/di.v19i2.1601>.

⁵ Fuad Jaya Miharja, "Literasi Islam Dan Literasi Sains Sebagai Penjamin Mutu Kualitas Manusia Indonesia Di Era Globalisasi," *Prosiding Seminar Nasional Pendidikan Biologi 2016*, 2016, 1010–18.

⁶ Ardian Asyhari, "Literasi Sains Berbasis Nilai-Nilai Islam Dan Budaya Indonesia," *Jurnal Ilmiah Pendidikan Fisika Al-Biruni* 6, no. 1 (2017): 137, <https://doi.org/10.24042/jpifalbiruni.v6i1.1584>.

in science and technology, and be able to think logically, critically, and creatively. Students with high scientific literacy will also be good in their morals towards Islamic values implemented in an attitude per religious demands (*Allah SWT* and His Messenger).

Moreover, consistent with technological developments, especially in education in the context of welcoming 21st-century learning, it requires teachers to innovate in developing teaching materials packaged practically and flexibly in the teaching and learning process. In this case, teaching materials are one of the essential components in improving students' scientific literacy skills⁷. In line with the rapid development of technology in learning, textbooks appear to meet the need for fast and accessible information in the form of electronic books, better known as e-books.

Learning with e-books is also an innovation of teaching materials in the form of non-prints with a shape resembling a printed book that produces products in the form of soft files to be efficient⁸. With the e-book, students find it easy to find information about learning and communicate with teachers⁹. In addition, some software can convert modules into electronic forms, such as flipbooks¹⁰. The application utilized to develop an e-book based on scientific literacy integrated with Islamic values in this study was a 3D page flip.

Several weaknesses were found based on the preliminary analysis results on the teacher's book and the student's book in the Always Saving Energy Class IV theme. 1). There was an unbalanced proportion of scientific literacy content; 2). In the student book, it was not fully integrated with Islamic values; 3). The material in the student book was limited to the theme of *Always Saving Energy*. The analysis results are supported by interviews with the fourth-grade teacher at Islamic Elementary School (MI) NU Tamrinut Thullab. It was revealed that the teacher's lack of interest in developing teaching materials was due to time constraints and the lack of knowledge about information technology, so they did not develop their competence in making innovative teaching materials.

⁷ Siti Raihan, Haryono, and Farid Ahmadi, "Development of Scientific Learning E-Book Using 3D Pageflip Professional Program," *Innovative Journal Of Curriculum and Educational Technology* 7, no. 1 (2018): 7–14.

⁸ Raihan, Haryono, and Ahmadi.

⁹ Fernindia Eva Sabtaningrum, Iskandar Wiyokusumo, and Ibut Priono Leksono, "Multicultural Based Integrated Thematic E-Book in SFH (School from Home) Activities," *Jurnal Ilmiah Sekolah Dasar* 4, no. 2 (2020): 153.

¹⁰ Charlina Charlina et al., "Electronic Module as Learning Needs to Write Exposition Texts for Junior High School Students," *Journal of Education and Learning (EduLearn)* 16, no. 2 (2022): 219–25, <https://doi.org/10.11591/edulearn.v16i2.20402>.

Related to that, first, Anshori stated that integrating Islamic values increases the enthusiasm or motivation of students to learn¹¹. Second, mastery of the learning content increases students' knowledge and reflects on the cultivation of moral and spiritual values in teaching materials to shape the students' attitudes and personalities. Then, the importance of reflection in learning is to increase knowledge and develop teachers' and students' attitudes, personalities, and skills¹².

For that reason, it is necessary to develop interactive e-book teaching materials that can be used as alternative learning resources. It is further expected to improve scientific literacy and instill Islamic values in students using 3D page flip software on theme 4, "Sehat itu Penting" class V.

RESEARCH METHOD

This research's design was Research and Development (R&D). Research and development methods are generally used to produce specific products and test their effectiveness¹³. Then, the model employed was the 4-D model development. The 4-D development model consists of four main stages: define, design, develop and disseminate¹⁴. In addition, the samples of this study were Islamic Elementary School (MI) Miftahul Huda 02 Dawe Kudus and Islamic Elementary School (MI) Al Huda Kunduran Blora. The trial of teaching materials was then carried out in two stages, i.e., a large-scale trial. The trial design used in this study was the pre-test and post-test control group.

Data collection techniques in this study were observation, interviews, questionnaires, tests, and documentation. Besides, data validity techniques are to test the instrument's validity in the form of a test used for content validity. Content validity testing can be conducted by consulting with experts and comparing the instrument contents with the material, and it is understood that the test is then already valid based on the test

¹¹ Isa Anshori, "Problem-Based Learning Remodelling Using Islamic Values Integration and Sociological Research in Madrasas," *International Journal of Instruction* 14, no. 2 (2021): 421–42, <https://doi.org/10.29333/iji.2021.14224a>.

¹² Resty Rahmatika et al., "Scientific Literacy Refinement at Islamic Junior High Schools Using Socio-Science Spirituality Learning Model," *JPBI (Jurnal Pendidikan Biologi Indonesia)* 8, no. 1 (2022): 40–50, <https://doi.org/10.22219/jpbi.v8i1.18989>.

¹³ Sugiono, "Metode Penelitian Pendidikan Pendekatan Kuantitatif, Kualitatif dan R&D," in *Alfabeta, Bandung*, 14th ed. (Bandung: Alfabeta, Bandung, 2012).

¹⁴ Sivasailam Thiagarajan, Ammel Dorothy A., and Melvyn I. Somme!, *Thiagarajan, Sivasailam; And Others Instructional Development for Training Teachers of Exceptional Children: A Sourcebook. Indiana Univ., Bloomington. Center for Innovation In*, 1974.

outlines. Therefore, by consulting with experts, content validity is based on logical analysis (logical validity) with expert judgment techniques. Afterward, in this research, the data analysis technique used a normality test, homogeneity test, analysis of the validity of teaching materials, and analysis of the effectiveness of e-book teaching materials with hypothesis testing (t-test).

Hypothesis testing was carried out to determine the mean difference in learning outcomes between the experimental and the control classes. The significance test was conducted at each testing stage (pre-test and post-test). The significance of the gain was determined using a t-test (independent sample t-test) using a significance level (of $\alpha=5\%$). The t-test was performed utilizing SPSS 21. In the two-mean similarity test, two hypotheses were proposed:

H₀: There is no difference in student learning outcomes between the control and the experimental classes.

H₁: There is a difference in student learning outcomes between the control and the experimental classes.

RESULTS AND DISCUSSION

RESULTS

1) Characteristics of Materials Based on Science Literacy Integrated with Islamic Values

The teaching materials developed were the curriculum 2013 thematic book for Class V on theme 4, "Sehat itu Penting." The development of teaching materials referred to the core and basic competencies outlined in the syllabus and lesson plan for learning natural science subjects. The natural science material developed in this research was material for human and animal circulatory organs, discussing (1) human circulatory organs, (2) animal blood circulation, (3) health benefits, (4) blood circulation function, and (5) health problems in blood circulation organs.

Moreover, the characteristics of the teaching materials developed were based on scientific literacy and integrated with Islamic values. Four aspects of scientific literacy were developed: (1) science as a body of knowledge, (2) science as a way to investigate, (3) science as a way of thinking, and (4) the interaction between science, technology, and society. Each aspect of scientific literacy was reflected in the "Ayo Belajar," "Mencoba

Yuk!” “Berfikir Ilmiah” and “Sains dalam Kehidupan” subsections, whereas Islamic values were displayed in the “Tahukah Kamu?” subsection.

The aspect of scientific literacy as a body of knowledge displays information or science contents, covering various kinds of knowledge, including facts, concepts, theories, laws, principles, and information. Then, aspects of scientific literacy as a body of knowledge were presented in the "Ayo Belajar" subsection, containing material that invited students to remember information to be used as a provision for students' knowledge to explore everyday phenomena.

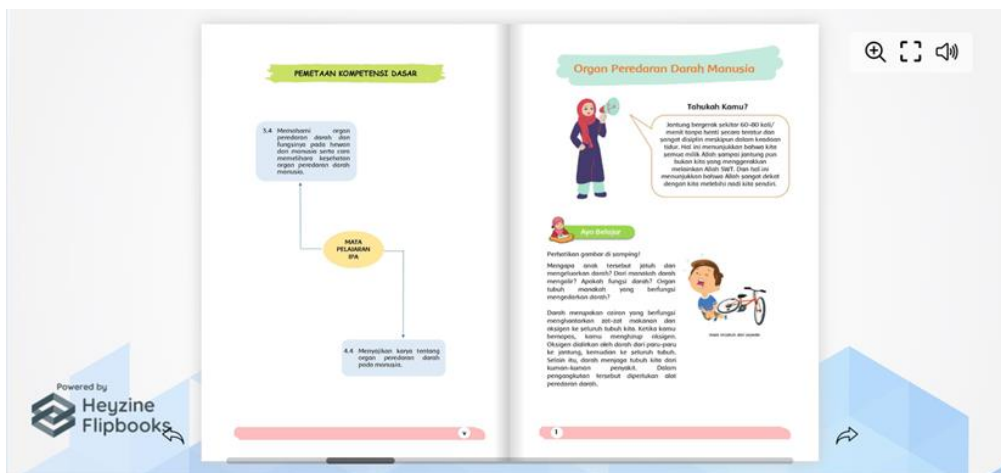


Figure 4.1
Aspects of Science as the Body of Knowledge

Next, the aspect of scientific literacy as a science to investigate was in the form of student activities in experimenting that link the knowledge and concepts possessed by students to the scientific process. In this regard, the aspect of scientific literacy as an investigative process was reflected in the "Mencoba Yuk!" subsection, inviting students to conduct investigations in experimental and observational activities. This subsection also contained the steps of student activities in conducting experiments, answering questions after the experiment, and concluding the experimental results obtained during the investigation. The investigation process by conducting simple experiments aims to strengthen the concepts obtained by students in the previous stage. With a scientific attitude, students can also understand the investigation process to find and build concepts understood based on the investigations carried out.

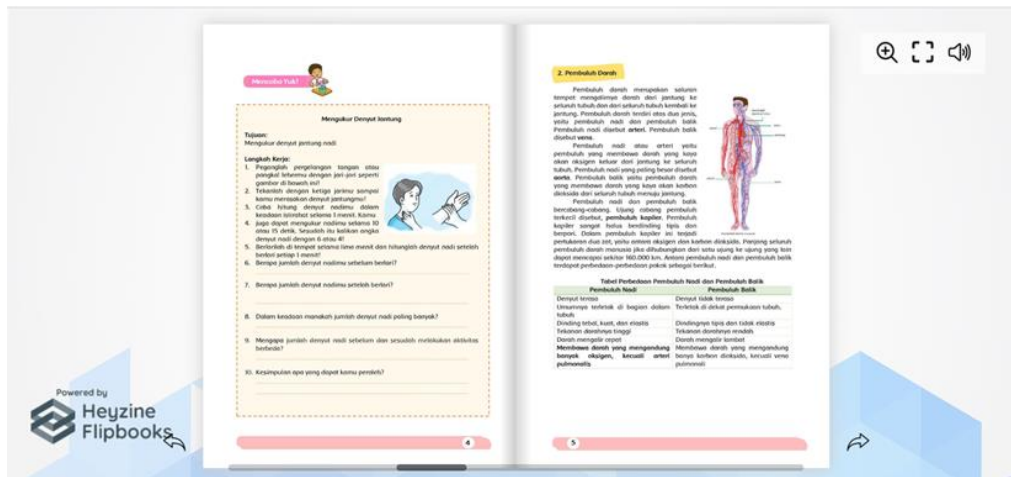


Figure 4.2
Aspects of Science as an Investigation Process

Then, the aspect of scientific literacy as a way of thinking gave an overview of scientists conducting scientific investigations and students' activities in the process of thinking, reasoning, analyzing, and reflecting on ongoing scientific activities. The aspect of scientific literacy as a way of thinking was depicted in the "Ayo Berpikir Ilmiah" subsection, comprising student activities discussing facts and evidence, finding causal relationships, presenting scientific methods, and problem-solving.

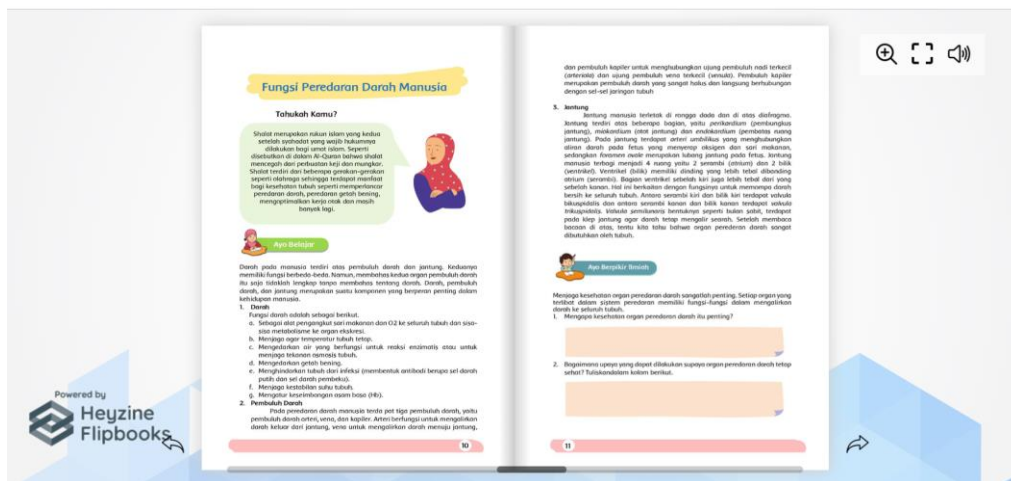


Figure 4.3
Aspects of Science as a Way of Thinking

Additionally, the interaction aspect of science, technology, and society had a percentage of 20% of the overall learning indicators. This aspect provided an overview of the application of science in human life and how technology has a positive and negative impact on society. This aspect of science, technology, and society is illustrated in "Sains dalam Kehidupan" subsection, containing how technology works, the technology used in

everyday life, and jobs in science and technology. In addition, the science in life subsection consisted of the positive and negative impacts of utilizing technology.

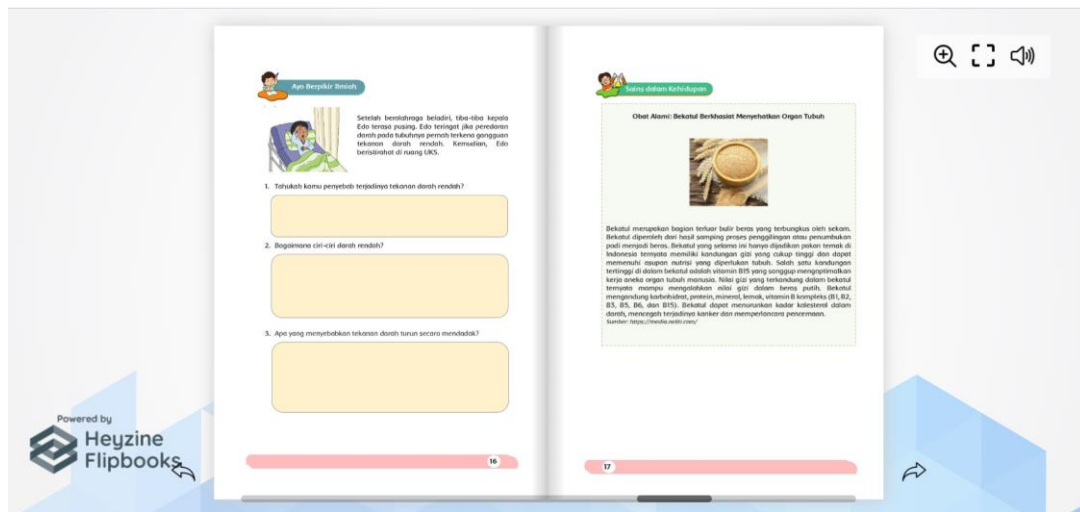


Figure 4.4
Interaction Aspects of Science, Technology, and Society

At last, aspects of Islamic values provided an overview of the material to be studied in the form of apperception by linking the subject matter with Islamic values. Aspects of Islamic values were reflected in the "Tahukah Kamu?," science figures, and "Jendela Islam" subsections. The "Tahukah Kamu?" subsection was an apperception to each chapter to be discussed in the material that students would learn. "Tahukah Kamu?" also invited students to relate the material to Islamic values. The material about the heart students studied was associated with regular and very disciplined heart movements. It denotes that all humans belong to Allah; even the heart is not the one who moves it but Allah SWT. Then, the Jendela Islam subsection discussed the provisions regarding halal and haram food, mentioned in the Qur'an Surah Al-Maidah verse 3, indicating that halal and haram food can affect the human circulatory system. Then, the character introduced to students in this e-book was Islamic figures that Ibn Nafis, or Ibn Al-Nafis Damishqui, was the first to accurately describe blood circulation in the human body.

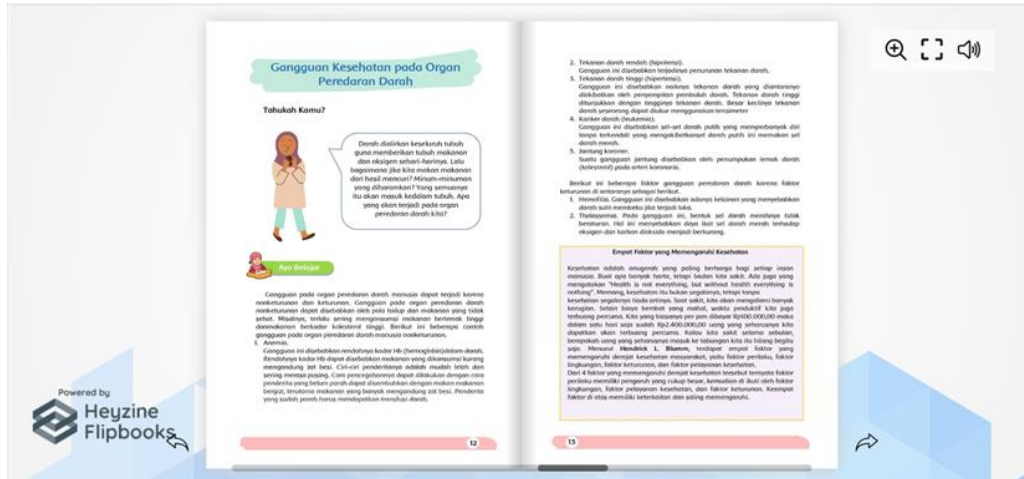


Figure 4.5
Aspects of Islamic Values “Tahukah Kamu?”

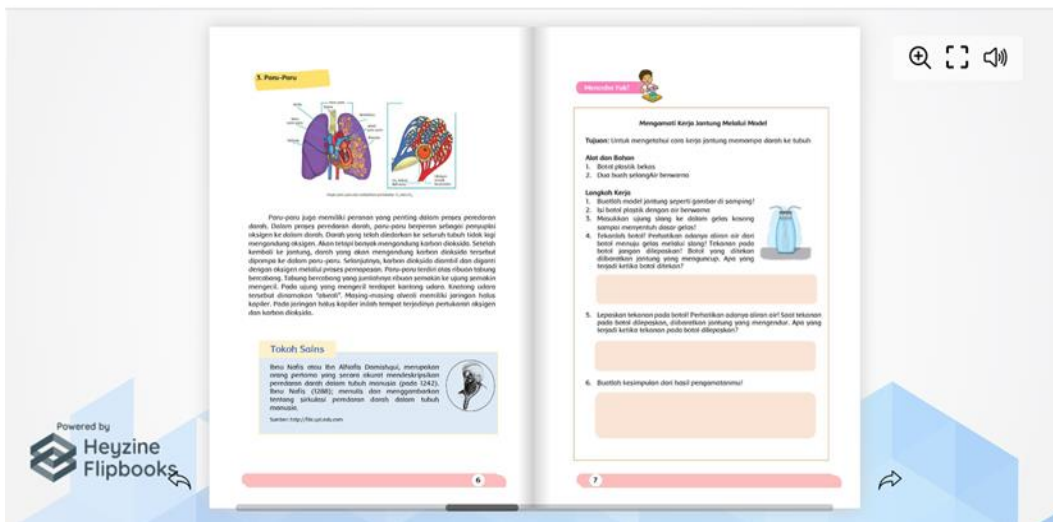


Figure 4.6
Aspects of Islamic Values "Tokoh Sains"

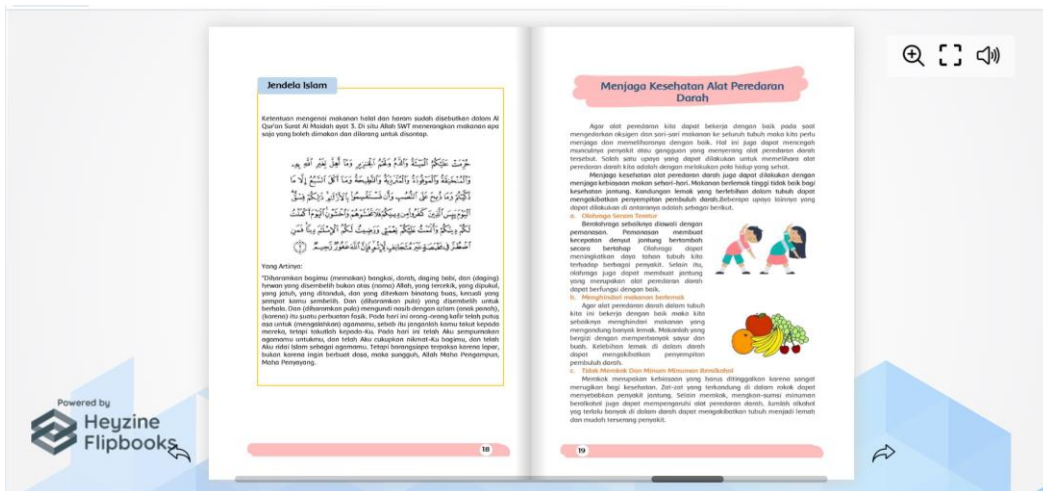


Figure 4.7
Aspects of Islamic Values “Jendela Islam”

2) The Validity of Teaching Materials

The natural science teaching materials based on scientific literacy integrated with Islamic values were validated by Islamic Elementary School Teacher Education Study Program (PGMI) Lecturers, natural science lecturers, and fifth-grade elementary school teachers. Aspects validated in teaching materials included (1) content feasibility, (2) presentation feasibility, (3) language feasibility, (4) graphic feasibility, and (4) scientific literacy component. Based on the validator's validation, several suggestions or inputs were obtained to improve teaching materials before being tested on a limited scale. Suggestions and input from the validator were that the integration of Islamic values and scientific literacy components should be improved. Suggestions and input from the validator were then used to improve teaching materials. The validation results of teaching materials are presented in Table 4.1.

Table 4.1
Results of Teaching Material Validation

Number	Aspects	Validation Results		
		V1	V2	V3
1	Content feasibility	83.33 %	87.50 %	91.67 %
2	Presentation feasibility	83.33 %	79.17 %	83.33 %
3	Language feasibility	90.00 %	85.00 %	85.00 %
4	Graphic feasibility	83.33 %	83.33 %	83.33 %
5	Aspects of scientific literacy	83.33 %	91.67 %	83.33 %
6	Integration of Islamic values	83.33 %	83.33 %	91.67 %
Mean		84.44 %	85.00 %	86.39 %
Final mean		85.28 %		
Criteria		Very Valid		

Based on Table 4.1, the validation results of teaching materials obtained a mean assessment of validator 1 of 84.44%, validator 2 of 85.00%, and validator 3 of 86.39%. The analysis results of the validators' validity and feasibility uncovered that the teaching materials developed obtained a final mean of 85.28%, with a very valid category.

3) Effectiveness of Teaching Materials

The effectiveness of teaching materials was based on analyzing scientific literacy skills integrated with Islamic values using tests. Data on the learning effectiveness using teaching materials were obtained from a large-scale trial in Islamic Elementary School (MI) Miftahul Huda 02, totaling 23 fifth-grade students. Before the effectiveness analysis, the analysis prerequisite test was performed, including the normality and homogeneity tests. After the two tests were met, it tested the mean difference and calculated the N-gain.

1. Ability of Cognitive Learning Outcomes

a. Normality Test

The normality test was used to determine whether the experimental and control classes' post-test value data were normally distributed. The normality test employed the Kolmogorov-Smirnov test on the Statistical Product and Service Solutions (SPSS) version 16th at a significant level of 0.05. Data processing was done by looking at the value column on the Kolmogorov-Smirnov. The data is said to be normal if the value shown in the Kolmogorov-Smirnov column is more significant than 0.05. The results of the post-test data analysis of the normality test can be seen in Table 4.2.

Table 4.2
Normality Test Results

	Statistic	df	Sig.
Control	.134	23	.200
Experimental	.145	20	.200

Based on the normality test with SPSS version 16th using the Kolmogorov-Smirnov test with a significance level of 0.05, it was found that the significance value for the experimental class was $0.181 > 0.05$, so H_0 was accepted. It demonstrates that the post-test scores in the experimental class were normally distributed. Moreover, the obtained significance value in the control class was $0.200 > 0.05$, so H_0 was accepted. It suggests that the post-test scores in the control class were normally distributed. Therefore, it can be concluded that the post-test value data for both the experimental and control classes were normally distributed. After the data was known to be normally distributed, it proceeded with the homogeneity test.

b. Homogeneity Test

The homogeneity test in this study was conducted to determine whether the results of the post-test scores between the experimental and the control classes had the same variance after being given different treatments. Hypothesis testing was carried out using an independent sample t-test utilizing SPSS version 16th. The decision-making and drawing conclusions on the hypothesis test were performed at a significant level of 0.05. If the significance is more than 0.05, it can be concluded that the variance is the same (homogeneous), but if the significance is less than 0.05, the variance is not homogeneous. The homogeneity test results can be seen in Table 4.3.

Table 4.3
Homogeneity Test

Levene Statistic	df1	df2	Sig.
3.231	1	41	.080

Based on Table 4.3, for the homogeneity test with SPSS version 16th using Levene's test with a significance level of 5%, the significance value in the Levene's test for equality of variances column in the independent sample test was $0.080 > 5\%$, so H_0 was accepted. It signifies that the post-test scores of students in the experimental and control classes were homogeneous.

c. Hypothesis Testing

Based on the normality test, the data on the increase in learning outcomes of the experimental and control classes were normally distributed and homogeneous. Hence, for testing the hypothesis, independent sample t-test statistics were used to measure the post-test scores between the experimental and control classes on SPSS version 16th. In hypothesis testing, some provisions must be used as guidelines. If $t\text{-count} < t\text{-table}$ or the significance value is > 0.05 , h_0 is accepted. Conversely, if $t\text{-count} > t\text{-table}$ or the significance value is < 0.05 , h_0 is rejected. In this study, the sample was 36 students, so the value of degrees of freedom (dk) = $n - 2 = 36 - 2 = 34$, and for an error rate of 5% for the 2-party test, it can be seen that the value = 2.032. The calculation results of the hypothesis test utilizing the SPSS version 16th program and the independent sample t-test results can be seen in Table 4.4.

Table 4.4
Mean Difference Test

		Levene's Test				Sig. (2-tailed)	Mean Difference
		F	Sig.	t	df		
Value	Equal variances assumed	3.231	.080	5.052	41	.000	14.502
	Equal variances not assumed			4.910	31.949	.000	14.502

Based on Table 4.4, for the calculation results of the hypothesis test using the SPSS version 16th program, the independent sample t-test showed that the equal variances assumed column in column t was 7.640, and the significance was 0.000. From the results of these calculations, it can be seen that $7.640 > 2.032$ or $t\text{-count} > t\text{-table}$ and $0.000 < 0.005$ or significance value < 0.05 . Under the applicable provisions for testing the hypothesis that the researcher described above, H_0 was rejected. Thus, this study concludes that there were differences in student learning outcomes between the control and the experimental classes. To find out the difference in learning outcomes, it can be seen in Table 4.5.

Table 4.5
Differences in Learning Outcomes

Class	N	Mean	Std. Deviation	Std. Error Mean
Experimental	23	87.65	7.377	1.538
Control	20	73.15	11.278	2.522

Table 4.5 reveals that the mean of the experimental class was 87.65, while the mean of the control class was 73.15. These results showed that the experimental class's mean was more significant than the control class. It suggests that the experimental learning outcomes were better than those of the control class.

d. N-Gain Test Results

The increase in students' scientific literacy learning outcomes was obtained from the pre-test scores before integrating natural science teaching materials based on scientific literacy and post-test scores after using them. The effectiveness of student learning outcomes was first tested using the normalized gain test.

The gain test was conducted to determine the increase between the pre-test and post-test scores. N-gain test results can be seen in Table 4.6.

Table 4.6
N-Gain Test Results

Class	Mean		N-Gain
	Pre-test	Post-test	
Experimental	51.16	87.68	0.75
Control	50.67	72.85	0.45

From Table 4.6, it is known that the N-gain result in the experimental class was 0.75. It signifies that the increase in the N-gain was $g > 0.70$, belonging to the high criteria. Meanwhile, the N-gain result in the control class was 0.45. It denotes that the increase in the N-gain was $g < 0.70$, indicating moderate criteria. Based on the N-gain data analysis test above, it can be concluded that both the experimental and control classes had increased scores between the pre-test and post-test, but the experimental class was higher than the control class. The comparison of the increase (gain) of cognitive learning outcomes for each aspect of scientific literacy in the control and experimental class can be seen in Figure 4.10.

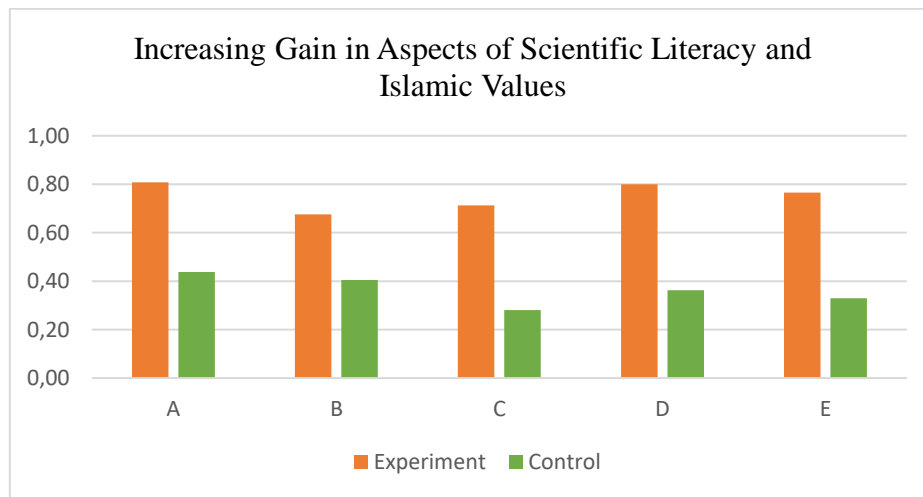


Figure 4.10
Gain Improvement in Scientific Literacy Aspect

Information:

- A = Science as the body of knowledge
- B = Science as an investigative process
- C = Science as a scientific thinking process thinking
- D = The interaction of science, technology, and society
- E = Islamic values

Figure 4.10 shows that the increase in learning outcomes of each aspect of students' scientific literacy in the experimental class was higher than in the control class. In the experimental class, the aspect of science as the body of knowledge achieved the highest increase, i.e., 0.81. It was followed by the aspect of science as an investigative process with 0.68; the aspect of science as a scientific thinking process with 0.71; the interaction aspect of science, technology, and society with 0.80; and Islamic values with 0.76. On the other hand, in the control class, the aspect of science as a body of knowledge obtained the most significant increase at 0.44. Afterward, the aspect of science as an investigative process had an increase of 0.41, the aspect of science as a scientific thinking process had an increase of 0.28, the interaction aspect of science, technology, and society had an increase of 0.38, and Islamic values had an increase of 0.33.

DISCUSSION

1) Characteristics of 3D Page Flip E-Book Teaching Materials Based on Science Literacy Integrated with Islamic Values

The teaching materials developed were in the form of natural science teaching materials based on scientific literacy integrated with Islamic values in theme 4, “Sehat itu Penting”. Through natural science learning, students can gain hands-on experience to apply better the concepts they have learned. The characteristics of the development of natural science teaching materials applied in this development research contained four aspects of scientific literacy: (1) science as a body of knowledge, (2) science as a way to investigate, (3) science as a way of thinking, and (4) the interaction between science, technology, and society. It aligns with Chiapetta, Filman & Sethna¹⁵, who stated that scientific literacy contains four aspects of scientific literacy: science as the body of knowledge, science as a way to investigate, science as a way of thinking, and the interaction between science, technology, and society.

The aspect of scientific literacy as a body of knowledge was reflected in the “Ayo Belajar” subsection, which contained material that invited students to remember information to explore everyday phenomena. Then, the aspect of scientific literacy as an investigation process was depicted in the “Mencoba Yuk!” subsection. The “Mencoba

¹⁵ G.H Chiapetta, E.L., Filman. D.A., & Sethna, “A Method to Quantify Major Themes of Scientific Literacy in Science Textbooks,” *Journal of Research in Science Teaching* 28, no. 8 (1991): 713–25.

Yuk!" subsection encouraged students to conduct investigations in experimental and observational activities. This subsection covered the steps of student activities in conducting experiments, answering questions after conducting the experiment and concluding the experimental results obtained during the investigation. Moreover, the aspect of scientific literacy as a way of thinking was presented in the "Berpikir Ilmiah" subsection. It consisted of student activities discussing facts and evidence, finding causal relationships, presenting scientific methods, and problem-solving. Next, the interaction aspect of science, technology, and society is illustrated in the "Sains dalam Kehidupan" subsection. It comprises how technology works, the technology used in everyday life, and jobs in science and technology.

Finally, the "Tahukah Kamu?", "Jendela Islam" and "Tokoh Sains" subsections all featured aspects of Islamic values. The "Tahukah Kamu?" part was intended to be a discussion point for each chapter's content that the students would be taught. It also encouraged students to connect the information to Islamic values. In this e-book, the information about the heart that students learned was connected to regular, extremely controlled heartbeats. It signifies that all people are property of *Allah*, including the heart, which is moved by none other than *Allah SWT*. Then, the requirements of halal and haram food were discussed in the *Jendela Islam* part. These provisions were mentioned in the *Qur'an Surah Al-Maidah verse 3*, which indicates that halal and haram food might alter a person's circulatory system. In addition, an Islamic person who is credited with being the first to explain blood circulation in the human body correctly—Ibn Nafis or Ibn Al-Nafis Damishqui—was introduced to the students in this e-book.

Integrating Islamic values into learning allows students to easily relate any science material they learn to their daily lives because natural science and religion are interrelated. The learning materials are also designed to facilitate the students to master daily conversations and internalize Islamic values¹⁶. In addition, science and religion are one unified and interrelated science¹⁷. Hence, integrating Islamic values increases the

¹⁶ Muhammad Zuhri Anshari and Agus Widyantoro, "Inculcating Islamic Values Contented in Qs. Luqman through English Speaking Materials," *Journal of Education and Learning (EduLearn)* 14, no. 1 (2020): 62–68, <https://doi.org/10.11591/edulearn.v14i1.14285>.

¹⁷ Nasiruddin, "INTEGRASI SAINS DAN AGAMA DALAM PENDIDIKAN ISLAM," *Literasi* IV, no. 2 (2013): 171–88.

enthusiasm or motivation of students to learn¹⁸. Islamic values-integrated learning is one of the strategies that can be applied to improve student's learning results. Further, science learning integrated with Islamic values allows students to relate scientific knowledge with their concepts and experiences in real life as Muslims to feel that their learning is meaningful¹⁹.

The preparation of teaching materials was developed with full-color designs. There were pictures to attract students' attention to increase their interest in reading. This e-book was also packaged in simple language with supporting illustrations. Thus, it is expected that students can easily understand the material.

2) Validity of 3D Page Flip E-Book Teaching Materials Based on Science Literacy Integrated with Islamic Values

The e-book science teaching materials based on scientific literacy integrated with Islamic values used in the large-scale trial were tested for validity first by the validator. Based on the validity test of Islamic Elementary School Teacher Education Study Program (PGMI) Lecturers, natural science lecturers, and fifth-grade elementary school teachers, science teaching materials based on scientific literacy integrated with Islamic values were included in the very valid category. This research is in line with that conducted by Sumantri & Kholiq²⁰, stating that the ELS-3D (E-Book of Science Literacy Based on 3D Page Flip) developed is feasible to be used as a learning medium to improve scientific literacy. Also, Kurniawati, Akhdinirwanto & Fatmaryanti²¹ unveiled that using the 3D page flip professional application in their study was declared valid, effective, and practical.

¹⁸ Anshori, "Problem-Based Learning Remodelling Using Islamic Values Integration and Sociological Research in Madrasahs."

¹⁹ Nining Purwati et al., "Increasing Islamic Junior High School Students Learning Outcomes through Integration of Science Learning and Islamic Values," *International Journal of Instruction* 11, no. 4 (2018): 841–54, <https://doi.org/10.12973/iji.2018.11453a>.

²⁰ Faradela Naba Sumantri and Abd. Kholiq, "Pengembangan ELS-3D (E-Book Literasi Sains Berbasis 3d Page Flip) Pada Materi Momentum Dan Impuls," *IPF : Inovasi Pendidikan Fisika* 09, no. 03 (2020): 479–83.

²¹ Titin Dwi Kurniawati, Raden Wakhid Akhdinirwanti, and Siska Desy Fatmaryanti, "Pengembangan E-Modul Menggunakan Aplikasi 3D PageFlip Professional Untuk Meningkatkan Kemampuan Literasi Sains Peserta Didik," *Jurnal Inovasi Pendidikan Sains (JIPS)* 2, no. 1 (2021): 32–41.

Additionally, the teaching materials were developed to refer to the feasibility aspects of teaching materials from the National Education Standards Agency,²² consisting of aspects of content feasibility, presentation feasibility, language feasibility, and graphic feasibility. There was also a scientific literacy component in the teaching materials. It is consistent with the research results from Mukhayati and Sriyati²³, who stated that the development of teaching materials has to follow the guidelines for developing teaching materials. The development guide is then combined with the material needs of the teaching materials. In this study, from the validity of integrated natural science teaching materials based on scientific literacy by the validators, some suggestions and input were obtained. These suggestions were then used to make improvements to teaching materials to be better.

In the aspect of the content feasibility of the e-book teaching natural science teaching materials based on scientific literacy integrated with Islamic values, the materials were presented in accordance with the core competencies, basic competencies, and indicators determined. The difficulty level was adjusted according to the student's development, from easy to complex material, and the material was presented starting from exploring students' knowledge and conducting investigations until students could think scientifically. It follows the principle of teaching materials from the Ministry of National Education²⁴, which states that the development of teaching materials should start from the easy-to-understand to the difficult, from the concrete-to-understand to the abstract.

In the aspect of the presentation feasibility of teaching materials, the materials were presented sequentially and systematically according to learning activities starting from apperception, core material in the "Ayo Belajar" subsection, investigation activities in the "Mencoba Yuk!" subsection, scientific thinking in the "Berpikir Ilmiah" subsection, interaction science, technology, and society in "Sains dalam Kehidupan" subsection, and closing material in the "Ayo Presentasikan" and "Ayo Renungkan" subsections. Here, teaching materials serve as guidelines for teachers and students in the learning process

²² Badan Standar Nasional Pendidikan, "Kegiatan Penilaian Buku Teks Pelajaran Pendidikan Dasar Dan Menengah," *Buletin BSNP Media Komunikasi Dan Dialog Standar Pendidikan* II, no. 1 (2007): 1–24.

²³ Mukhayati and Sriyati, "Pengembangan Bahan Ajar Perubahan Lingkungan Berbasis Realitas Lokal Dan Literasi Lingkungan," *Jurnal Pendidikan Biologi* 12 (2015): 151–61.

²⁴ Program Pendidikan et al., "Menteri Pendidikan Nasional Republik Indonesia" 44, no. 2 (2007): 8–10.

and become a tool for evaluating the achievement of these learning outcomes²⁵. Furthermore, the linguistic aspect of teaching materials was in accordance with students' level of knowledge and understanding. The language used was effective, interesting, and easy to understand, and the messages were conveyed in interesting and communicative language, motivating students. As for the graphic aspect, teaching materials were presented in full color, with pictures and illustrations in attractive colors. Therefore, the presentation of the material was in accordance with the student's character. In addition, materials based on science literacy integrated with Islamic values were developed, referring to sources from the National Education Standards Agency (BSNP) to make valid teaching materials used in natural science and scientific literacy.

3) The Effectiveness of 3D Page Flip E-Book Teaching Materials Based on Science Literacy Integrated with Islamic Values

Based on the large-scale trial results, it was proven that the e-book teaching materials based on integrated scientific literacy with Islamic values were effectively used. The effectiveness of the developed teaching materials can help teachers and students in the learning process and make it easier for students to learn every competency that must be mastered.

In this study, the scientific literacy test was carried out at the beginning (pre-test) and the end (post-test). The analysis uncovered that the developed teaching materials effectively improved students' scientific literacy. It was indicated by the t-test calculation results, which showed that the mean post-test in the experimental class was higher than in the control class. The mean value of the post-test for the experimental class was 87.68, while the mean value for the post-test for the control class was 72.85. The analysis was also carried out with a normalized gain test (N gain) to determine the increase in students' scientific literacy skills. It revealed that the scientific literacy testability of students in the experimental and control classes increased. It demonstrates that implementing teaching materials based on integrated scientific literacy with Islamic values into learning increased students' scientific literacy learning outcomes. The increase in student learning outcomes corroborates with Ahsani, Rusilowati & Anni's research that the scientific

²⁵ Sitti Jamilah, "Examining Teaching Materials in Higher Education Against Religious Intolerance and Pluralism in the Global Era: Islamic Perspective," *Dinamika Ilmu* 21, no. 2 (2021): 477–89, <https://doi.org/10.21093/di.v21i2.3878>.

literacy ability of students who used science teaching materials based on integrated scientific literacy with Islamic values was higher than students who used books commonly used in schools²⁶. The results are also in accordance with the research of Budiningsih, Rusilowati, & Marwoto²⁷ that the mean increase in scientific literacy learning outcomes in the experimental class was better than in the control class. Similar research has also been conducted by Musripah²⁸, who argued that 3D page flip e-books could make it easier for students to understand abstract material, and implementation of learning using 3D page flip e-books could improve student learning outcomes.

The increase in students' scientific literacy learning outcomes is because the teaching materials developed in the theme of objects in the surrounding environment are close to students' lives, and the materials contained in teaching materials present real problems so that they can lead students to find concepts in everyday life. It aligns with the research results of Cristina, Rusilowati & Sunarno²⁹, showing that the teaching materials developed could improve students' scientific literacy skills.

Furthermore, the highest increase or gain in students' scientific literacy skills was found in science as the body of knowledge, while the lowest aspect was found in science as a scientific thinking process. The study results are in line with the research of Safitri, Rusilowati, & Sunarno, which stated that the lowest increase in students' scientific literacy skills is in the aspect of science as a way of thinking³⁰. The low level of students' thinking ability was seen in students who had not understood the concept of changing objects' shape and analyzing and relating cause and effect in everyday life. Students also had difficulty finding ideas in scientific thinking process activities due to a lack of student

²⁶ Eva Luthfi Fakhru Ahsani, Ani Rusilowati, and Catharina Tri Anni, "The Development of Integrated Science Teaching Materials Based on the Science Literacy of Fifth Graders," *1st ICONECT International Conference Education, Culture and Technology*, no. Query date: 2020-08-14 14:24:03 (2020): 65–71.

²⁷ Theresia Yulin Budiningsih, Ani Rusilowati, and Putut Marwoto, "Pengembangan Buku Ajar Ipa Terpadu Berorientasi Literasi Sains Materi Energi Dan Suhu," *Journal of Innovative Science Education* 4, no. 2 (2015): 34–40.

²⁸ Siti Musripah, "Pengembangan Media 3d Pageflip E- Book Untuk Hasil Belajar Pada Mata Pelajaran Ipa Kelas V Sdn 22 Sungai Ambawang," *Jurnal Pendidikan Dan Pembelajaran Khatulistiwa* 6, no. 1 (2017): 51–66.

²⁹ Amelia Cristina and Ani Rusilowati, "Pengembangan Bahan Ajar Ipa Terpadu Berbasis Literasi Sains Bertema Aplikasi Konsep Energi Dalam Kehidupan," *Pengembangan Bahan Ajar Ipa Terpadu Berbasis Literasi Sains Bertema Aplikasi Konsep Energi Dalam Kehidupan* 5, no. 1 (2015), <https://doi.org/10.15294/upej.v5i1.12703>.

³⁰ &Sunarno Safitri, A. D., Rusilowati, A., "Pengembangan Bahan Ajar IPA Terpadu Berbasis Literasi Sains Bertema Gejala Alam," *Unnes Physics Education Journal* 4, no. 2 (2015): 33–40.

understanding. Therefore, to improve learning outcomes, it is necessary to get used to understanding concepts and good reasoning so that it is easier for someone to relate the concept to other concepts and everyday events. Meanwhile, scientific literacy-based teaching materials direct students to be scientifically literate, transferring concepts in rote memorization and understanding concepts and applying them in everyday life.

The learning process by using e-book science teaching materials based on scientific literacy integrated with Islamic values also made students active and happy in participating in learning. Thus, using learning resources from e-books could make it easier for students to understand the material independently³¹. Students preferred additional features offered by e-books over printed textbooks³². Through electronic books, students can learn in a fun way and acquire new skills³³.

Based on the learning carried out, the students' attitudes observed were spiritual, curiosity, cooperation, and responsibility. Students' attitudes toward learning seemed to have increased from the first meeting to the last. In this regard, scientific attitude becomes the fundamental goal of science learning to be developed and must be achieved by all students since scientific attitude is one of the cognitive components³⁴.

In each lesson, students were divided into several groups heterogeneously. The division of groups made students more enthusiastic and happier in participating in learning. In addition, groups could also develop a cooperative attitude between students in discussions and when conducting experiments. It agrees with Harsanto's opinion that studying together in groups will improve academic abilities and positive attitudes toward school. Research on scientific literacy and Islamic values is a guarantor of the quality of Indonesian human quality in the globalization era, whereas the research results, indicating

³¹ Mursalin Mursalin, "The Critical Thinking Abilities in Learning Using Elementary Algebra E-Books: A Case Study at Public Universities in Indonesia," *Malikussaleh Journal of Mathematics Learning (MJML)* 2, no. 1 (2019): 29, <https://doi.org/10.29103/mjml.v2i1.2292>.

³² Bibiana Chiu Yiong Lim, Llewellyn Wee Ling Liu, and Chian Hou Choo, "Investigating the Effects of Interactive E-Book towards Academic Achievement," *Asian Journal of University Education* 16, no. 3 (2020): 78–88, <https://doi.org/10.24191/ajue.v16i3.10272>.

³³ Luthfia Puspa Pradina and Agus Suyatna, "Atom Core Interactive Electronic Book to Develop Self Efficacy and Critical Thinking Skills," *The Turkish Online Journal of Educational Technology* 17, no. 1 (2018): 17–23.

³⁴ Romi Adiansyah et al., "The Correlation between Metacognitive Skills and Scientific Attitudes towards the Retention of Male and Female Students in South Sulawesi, Indonesia," *International Journal of Evaluation and Research in Education* 10, no. 4 (2021): 1272–81, <https://doi.org/10.11591/IJERE.V10I4.21597>.

that a high-quality society is shown by good scientific literacy and Islamic literacy skills, are a form of gratitude to *Allah SWT*³⁵.

Based on this, it can be concluded that the teaching materials developed effectively improved students' scientific literacy. Consistent with that, Sumantri & Kholiq³⁶ stated that the ELS-3D (E-Book of Science Literacy Based on 3D Page Flip), which had been developed, could improve students' scientific literacy.

After conducting research and analyzing data findings, the researcher found novelty in this study compared to previous research. It includes the focus of study, i.e., the development of scientific literacy-based teaching materials integrated with Islamic values. With the development of this book, it is hoped that it can shape students' character, not only being proficient in literacy but also having a good attitude based on Islamic values.

CONCLUSION

From the research results, it can be concluded that:

1. Characteristics of teaching materials, 3D page flip e-books based on scientific literacy integrated with Islamic values on the theme of “Sehat itu Penting” covered aspects of science as the body of knowledge, science as a way to investigate, science as a way of thinking, aspects of the interaction between science, technology, and society, and Islamic values. The aspects of scientific literacy were contained in the subsections of teaching materials, such as Let's Learn, Let's Try, Let's Think Scientifically, Science in Life, and *Jendela Islam*.
2. The validity of teaching materials, 3D page flip e-books based on scientific literacy integrated with Islamic values on the theme of “Sehat itu Penting”, was included in a very valid criterion. Based on the research results, the validity level of teaching materials had a mean of 85.28%, so teaching materials were categorized as very valid.
3. Teaching materials, 3D page flip e-books based on scientific literacy integrated with Islamic values on “Sehat itu Penting” effectively improved students' scientific literacy

³⁵ Rahma Diani and Niken Sri Hartati, “Flipbook Berbasis Literasi Islam: Pengembangan Media Pembelajaran Fisika Dengan 3D Pageflip Professional Flipbook Based on Islamic Literacy: The Development of Physics Learning Media Using 3D Pageflip Professional,” *Jurnal Inovasi Pendidikan IPA* 4, no. 2 (2018): 234–43.

³⁶ Sumantri and Kholiq, “Pengembangan ELS-3D (E-Book Literasi Sains Berbasis 3d Page Flip) Pada Materi Momentum Dan Impuls.”

skills. Based on the results of the similarity test of the two means, the experimental class had a higher increase in cognitive learning outcomes than the control class.

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DECLARATION OF CONFLICTING INTERESTS

I hereby declare that the researcher has no potential conflict of interest with this article's research, authorship, and/or publication.

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