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# Development of Booklets Integrated with Islamic Values Based on Socio- Scientific Issues to Improve Science Literacy

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**ABSTRACT**

*One of the persistent challenges in education is the lack of innovation in teaching materials. Conventional textbooks often fail to connect scientific content with real-world environmental issues, contributing to students' low levels of scientific literacy. This study aims to evaluate the feasibility and effectiveness of a socio-scientific issue (SSI)-based booklet integrated with Islamic values in enhancing students' scientific literacy. Utilizing the Borg & Gall research and development model, the study employed purposive sampling involving 33 students from class VIIF at MTs Nurul Huda Tarub. Data were collected through questionnaires and literacy tests. Expert validation and effectiveness analyses were conducted using expert judgment and paired sample t-tests, respectively. The booklet received high validation scores: 96% from material experts, 97% from media experts, 97% from educators for practicality, and 98% from student evaluations. The paired sample t-test yielded a significance value of 0.000, indicating a statistically significant improvement in scientific literacy post-intervention. The findings affirm that the developed booklet is highly valid and effective in promoting students' scientific literacy. This suggests that embedding Islamic values within SSI-based learning materials can foster more contextual, meaningful, and character-building science education, supporting the holistic development of students' scientific reasoning and religious awareness*

**Keywords**: *booklet, integrated islamic values, scientific literacy.*

## INTRODUCTION

The success of education is highly influenced by the learning process, particularly the interaction between students and learning resources within the educational environment. Learning resources play a crucial role in achieving educational objectives and can take the form of data, individuals, or structured materials designed to support students in reaching their learning goals (Regmi & Jones, 2020; Fitri, 2020; Rahim, 2023). Nevertheless, learning resources are not the sole determinants of educational success; other factors such as curriculum, instructional methods, media, facilities, and infrastructure also contribute significantly (Rasmitadila et al., 2020). The Merdeka curriculum, for example, emphasizes the P5 dimensions, which include comprehension, application, meaningful learning, character development, and ongoing assessment (Jamaludin et al., 2022; Arwitaningsih et al., 2023).

Observations at MTs Nurul Huda Tarub revealed the simultaneous implementation of two curricula: the Merdeka curriculum for grade VII and the K13 curriculum for grades VIII and IX. This disparity has led to the unavailability of suitable teaching materials, placing additional burdens on teachers. Consequently, traditional and less engaging methods such as lectures are frequently used (Widiani et al., 2020). The existing science textbook, focused on experiments and theoretical content, lacks contextual integration with students' environments, which impedes the development of environmentally conscious attitudes and contributes to low levels of scientific literacy (Sabri, 2020; Mudawamah, 2020). This concern aligns with the 2018 Program for International Student Assessment (PISA) results, where Indonesia ranked 71st out of 78 countries in science literacy. The report indicated that 15-year-old Indonesian students exhibit low scientific proficiency, attributed in part to the misalignment between the curriculum and teaching materials, as well as the lack of real-world application in the learning process (Sutrisna, 2021).

To address these challenges, various studies have explored the development of innovative and effective teaching materials, including environmentally focused booklets designed to cultivate both scientific literacy and character. Booklets, which are portable and concise, are seen as effective tools to promote problem-solving skills and environmental awareness (Nurhasbiansah, 2020; Suryadi & Kurniati, 2021). Research by Aswirna and Ritonga (2020) demonstrated the effectiveness of e-booklets based on discovery learning in improving students' science literacy. However, most prior developments have not explicitly incorporated religious or spiritual values.

A review of existing teaching materials at the MTs level reveals a lack of resources that combine the Socio-Scientific Issues (SSI) approach with Islamic values. Although previous studies—such as those by Suryadi and Kurniati (2021), Aswirna and Ritonga (2020), and Lestari (2021)—have shown the effectiveness of SSI or environment-based booklets, they have not comprehensively integrated Islamic character values. Therefore, this study seeks to fill that gap by developing a contextual and innovative SSI-based booklet that embeds Islamic values to improve not only students' scientific literacy but also their environmental and moral consciousness. Integrating Islamic values into SSI-based booklets has the potential to foster environmental awareness and scientific reasoning among students (Mudawamah, 2020). This booklet is expected to serve as an engaging and curriculum-aligned teaching resource that can support educators in delivering more meaningful and character-oriented science education (Kristyowati & Purwanto, 2019; Pratiwi et al., 2019).

In light of the aforementioned issues, the objective of this study is to develop and evaluate a teaching material in the form of a socio-scientific issue (SSI)-based booklet integrated with Islamic values. The study also investigates the effectiveness of the developed booklet in enhancing students' scientific literacy.

## METHODOLOGY

This research employed a Research and Development (R&D) approach based on the model proposed by Borg and Gall. The model consists of ten systematic stages: (1) identifying and collecting data, (2) planning, (3) developing a preliminary product, (4) conducting an initial field trial, (5) revising based on initial trial feedback, (6) implementing the main field trial, (7) revising the product for operational use, (8) testing field implementation, (9) refining the final product, and (10) dissemination and implementation (Gall & Borg, 1996).

The product developed in this study was a socio-scientific issues (SSI)-based booklet integrated with Islamic values, specifically focused on the topic of environmental pollution. To

ensure its quality, the booklet underwent expert validation by three material experts and three instructional media experts, including faculty members from the Faculty of Mathematics and Natural Sciences (FMIPA) at Universitas Negeri Semarang (UNNES) and science teachers from MTs Nurul Huda Tarub. Additionally, practicality testing was conducted with science teachers from the same institution, while a limited user trial involved 10 students who had previously studied science using the booklet. The effectiveness test was performed on 33 students from class VIIF who had received instruction on environmental pollution. This effectiveness evaluation employed a pre-experimental one-group pretest-posttest design.

Multiple instruments were used for data collection. First, a validation questionnaire was administered to material and media experts, as well as to teachers, to evaluate content feasibility, linguistic clarity, visual design, and overall presentation. A separate practicality and user response questionnaire was distributed to students to assess ease of use, attractiveness, and content relevance. Second, a set of open-ended essay questions was used to assess students' scientific literacy before and after engaging with the booklet. These instruments provided both quantitative and qualitative data that informed product revision and effectiveness evaluation.

The validation and practicality questionnaires were structured around four key aspects aligned with national standards: (1) Content relevance (e.g., "Is the material aligned with the curriculum and learning objectives?"), (2) Presentation structure (e.g., "Is the information presented in a clear and systematic manner?"), (3) Graphic quality (e.g., "Does the visual design support content comprehension and engagement?"), and (4) Language use (e.g., "Is the language developmentally appropriate and communicative?"). For student respondents, the questions were oriented toward usability, visual appeal, and contextual relevance.

Quantitative data from expert reviews, teacher feedback, and student responses were analyzed using descriptive percentage techniques. Meanwhile, the effectiveness of the booklet was statistically tested using the paired sample t-test to determine the significance of differences between pretest and posttest scores. The booklet was considered valid if it received a "very valid" rating from experts, practical if users found it accessible and engaging, and effective if it produced a statistically significant improvement in students' scientific literacy.

The novelty of this study lies in both the pedagogical approach and the content integration of the teaching material. Unlike previous research that primarily focused on visual or digital enhancements of booklets, this study developed an SSI-based booklet that explicitly incorporates Islamic values. This integration offers a unique dimension in science education by simultaneously enhancing students' cognitive competencies and fostering character development—particularly environmental awareness and religious identity. As such, this study contributes a novel model of teaching material development that aligns with both contextual relevance and spiritual values in the Indonesian educational setting.

## RESULT AND DISCUSSION

### Feasibility of SSI Based Booklets Integrated with Islamic Values Material Expert Assessment Results

Material experts evaluated the booklet based on four main aspects: content feasibility, presentation quality, integration of Islamic values, and alignment with socio-scientific issues (SSI). The detailed results of the expert assessments are presented in Table 1.

**Table 1. Material Expert Assessment Results**

| Aspect | Validator | | | Aspect Score | Percentage | Average Percentage | Category |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | | | | |
| Material Feasibility | 52 | 52 | 45 | 52 | 96% | 96% | Very Valid |
| Presentation | 31 | 36 | 32 | 36 | 92% | | |
| Integration | 8 | 8 | 8 | 8 | 100% | | |
| SSI | 28 | 27 | 25 | 28 | 95% | | |

Validation by material experts was conducted by one university lecturer and two science educators. The validation process yielded an average score of 96%, falling under the "Very Valid" category. This high score is attributed to several strengths of the developed science booklet, including the use of accessible and student-friendly language, completeness and consistency in the presentation of material, alignment of content with core competencies and learning objectives, and the relevance of evaluation questions. These factors collectively contribute to the high validity of the booklet as a teaching resource. This finding aligns with the assertion of Sanjani (2021), who emphasized that instructional materials selected and utilized by educators must be aligned with learning objectives to enhance the effectiveness of teaching and foster better student comprehension.

## Media Expert Assessment Results

Media experts evaluated the teaching materials based on three key aspects: visual design (graphics), language clarity, and overall practicality. The results of this evaluation are summarized in Table 2.

**Table 2. Media Expert Assessment Results**

| Aspect | Validator | | | Aspect Score | Percentage | Average Percentage | Category |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | | | | |
| Graphics | 32 | 31 | 30 | 32 | 97% | 97% | Very Valid |
| Multimedia & Languages | 27 | 27 | 28 | 28 | 98% | | |
| Practicality | 11 | 12 | 12 | 12 | 97% | | |

The media expert evaluation was conducted in a single validation phase. Both the media expert lecturer and the teacher concluded that the developed booklet was highly appropriate for classroom use, with minor revisions recommended. The evaluation yielded a score of 97%, placing the booklet in the "Very Suitable" category. This confirms that the *SSI-based booklet integrated with Islamic values to enhance students' scientific literacy* is highly feasible for use as an instructional resource. However, media experts suggested improvements in the box layout design within specific sub-chapters, which were considered less optimal. These recommendations were subsequently addressed through revisions, resulting in a more polished and visually appealing product. The final version of the booklet was designed to be engaging and contextually rich, incorporating vivid environmental themes aligned with the topic of environmental pollution. This contextual and visual enhancement differentiates the SSI-based booklet with integrated Islamic values from other conventional science booklets. An example of the booklet cover is shown below.


**Figure 1. Booklet Cover**

Beyond its visual appeal, the booklet meaningfully integrates Islamic values by incorporating relevant Qur'anic verses and their interpretations (tafsir) in connection with key scientific concepts, particularly those related to environmental pollution. This integration positions the booklet not only as a cognitive learning tool but also as a medium for character education that bridges scientific understanding with spiritual and ethical values. Such an approach aligns with the theory of meaningful learning, which emphasizes the importance of connecting academic content to students' real-life experiences. Moreover, socio-scientific issue (SSI)-based learning is recognized for its potential to enhance students' critical, argumentative, and reflective thinking skills when engaging with complex social and scientific dilemmas (Zeidler & Nichols, 2009). Consequently, the developed booklet stands out as an innovative instructional material, distinct from conventional science booklets, due to its holistic consideration of moral, social, and emotional dimensions in science education. This is further supported by previous studies indicating that printed media with compelling visuals and embedded socio-religious values can significantly improve students' motivation and conceptual understanding (Indah et al., 2016).

## Practicality Test Assessment results

This evaluation was conducted to assess the practicality of the booklet from the perspective of science teachers, focusing on several key aspects: ease of use, presentation quality, perceived benefits, integration of Islamic values, and alignment with socio-scientific issues (SSI). The detailed results of this practicality assessment are presented in Table 3.

**Table 3. Practicality Assessment Results**

| Aspect | Validator | | Aspect Score | Percentage | Average Percentage | Category |
|---|---|---|---|---|---|---|
| | P 1 | P 2 | | | | |
| Convenience | 12 | 11 | 12 | 96% | 97% | Very Practical |
| Presentation | 20 | 20 | 20 | 100% | | |
| Benefit | 20 | 19 | 20 | 98% | | |
| Integration | 16 | 15 | 16 | 97% | | |
| SSI | 27 | 27 | 28 | 96% | | |

Based on the evaluation conducted by science teachers at the school, the practicality of the developed booklet was rated at 97%, indicating that it is highly practical and suitable for use as instructional material. Nonetheless, evaluators suggested the inclusion of additional Qur'anic verses

and hadiths to further enrich the content. These recommendations were addressed by integrating relevant Islamic references that align with the topic of environmental pollution. The integration of Islamic values, including Qur'anic verses and hadith, represents a strategic pedagogical approach to reinforcing students' spiritual awareness and fostering the development of religious character with a strong sense of environmental stewardship. This approach not only enhances the instructional content but also cultivates ecological consciousness grounded in moral and religious principles. As emphasized by Muspiroh (2014), science learning that is integrated with Islamic values offers a more holistic educational experience—enabling students to grasp scientific concepts cognitively while also recognizing their ethical responsibilities as stewards (khalifah) of the environment. Thus, the inclusion of these spiritual elements is seen as a meaningful enhancement that strengthens the connection between scientific learning and Islamic teachings, particularly within the real-world context of environmental challenges.

## Limited Trial

Limited trials were conducted with a sample of 10 students who had previously studied the topic of environmental pollution. An assessment sheet was used to evaluate the students' interest, the appropriateness of the material, and the clarity of language in the booklet's teaching materials prior to its full implementation. The results of these limited trials are presented in Table 4.

**Table 4. Limited Test Results**

| Aspect | Aspect Score | Total score | Percentage | Average Percentage | Category |
|---|---|---|---|---|---|
| Interest | 69 | 70 | 99% | 98% | Very good |
| Material | 100 | 100 | 100% | | |
| Language | 29 | 30 | 97% | | |

The limited trial involving 10 students resulted in an average score of 98%, indicating that the developed booklet is highly effective. The students demonstrated a strong understanding of the material and expressed significant interest in using the booklet as a learning resource. This positive response can be attributed to the booklet's relevance to real-world issues that students encounter in their environment, as well as the inclusion of an explanatory video, which further enhanced their engagement with the content. These findings are consistent with the research conducted by Laksono and Wibowo (2022), who developed Socio-Scientific Issues-based teaching materials to improve higher-order thinking skills. Their study also reported high feasibility ratings, with an average percentage of 79.5% for media experts, 87% for material experts, and 93% for teacher assessments.

## Effectiveness of SSI-Based Booklets Integrated with Islamic Values on Students' Scientific Literacy.

The results of the pre-test and post-test indicate a significant improvement in students' scientific literacy after using the SSI-based booklet integrated with Islamic values. This is demonstrated by the increase in average scores following the intervention. Therefore, it can be concluded that the use of science learning tools employing the SSI approach, integrated with Islamic values, effectively enhances students' scientific literacy. The average percentage for each scientific literacy indicator is presented in Table 5.

**Table 5. Average Percentage of Scientific Literacy**

| Indicator | Pretest | | Posttest | |
|---|---|---|---|---|
| | Percentage | Category | Percentage | Category |
| To identify scientific issues | 36 | Low | 85 | Very high |
| To explain scientific phenomena | 40 | Low | 89 | Very high |
| To use scientific evidence | 40 | Low | 93 | Very high |

The effectiveness of the developed booklet was assessed using a paired sample t-test to compare students' pre-test and post-test scores. The results of the paired sample t-test indicate that the booklet is effective in improving students' scientific literacy. The detailed results of the paired sample t-test calculations are presented in Table 6.

**Table 6. Paired sample t-Test results**

| Paired Samples Statistics | | | | | | |
|---|---|---|---|---|---|---|
| | | Mean | N | Std. Deviation | Std. Error Mean | Sig. (2-tailed) |
| Pair 1 | Pre Test | 39.30 | 33 | 4.524 | .788 | .000 |
| | Post Test | 89.64 | 33 | 5.213 | .907 | |

The effectiveness of the developed booklet in enhancing students' scientific literacy was assessed using pre-test and post-test results, with the paired sample t-test employed as the statistical method for comparison. The purpose of this effectiveness test is to gather empirical data and facts related to the use of the booklet. According to Kelana and Pratama (2019), scientific literacy encompasses three assessment dimensions: identifying scientific issues, explaining scientific phenomena, and using scientific evidence. These dimensions are reflected in the competency framework, with environmental pollution questions in the form of essay questions used to assess students' scientific literacy.

The SSI-based booklet integrated with Islamic values had a positive impact on students' scientific literacy, as evidenced by the pre-test and post-test results collected over four meetings. Initially, students' scientific literacy abilities were relatively low, with an average pre-test score of 39.40. However, after the intervention, there was a significant improvement, with the average score increasing to 89.64. The normality test indicated that the data followed a normal distribution, and the analysis showed a 53% improvement in scientific literacy, confirming that the booklet is effective in enhancing students' scientific literacy, as supported by the paired sample t-test with a significance of 0.000 ($p < 0.05$).

Factors contributing to this improvement include students' ability to analyze contextual issues, provide reasoned conclusions, and use scientific evidence in answering questions, as highlighted by Pursitasari et al. (2023). The booklet's use of videos also played a significant role in aiding students' understanding, particularly for complex topics such as environmental pollution. Visual media, such as videos, are proven to help present scientific concepts clearly and effectively (Oka, 2022).

The SSI approach in the booklet fosters an understanding of the relationship between social and scientific aspects, encouraging students to critically examine complex issues and propose evidence-based solutions. Students are encouraged to understand the implications of their decisions, incorporating ethical and social considerations into their solutions (Park et al., 2020;

Mann et al., 2021). This is further supported by Sharon and Baram-Tsabari (2020), who emphasize the importance of scientific evidence in shaping informed decision-making processes.

What sets this SSI-based booklet integrated with Islamic values apart from other teaching materials is its contextual relevance, addressing real-world issues such as environmental pollution. The booklet encourages scientific problem-solving through both individual and group work, helping students apply their knowledge in practical, real-life contexts. As Suhirman (2020) argued, learning focused on environmental issues can foster environmental awareness and contribute to the development of scientific literacy. This finding is consistent with research by Muhammad and Subekti (2023), which demonstrated that SSI-based teaching tools, such as gallery walk strategies, significantly improved environmental literacy and fostered a sense of environmental responsibility among students.

However, this study has limitations. The sample size was restricted to a single class, and no comparisons were made across different schools or educational levels. Additionally, the treatment duration was limited to four meetings, and the long-term effects of using the booklet have not been fully explored. Future research should involve larger sample sizes, more diverse geographical coverage, and longer observation periods to assess the sustainability of the booklet's impact on students' behavior and attitudes toward environmental issues. In conclusion, the primary contribution of this research is the development of contextual SSI-based teaching materials integrated with Islamic values, which effectively enhance students' scientific literacy. It is recommended that future studies expand on this work by testing the booklet's effectiveness in a wider context and over a more extended period.

## CONCLUSION

The feasibility of the developed booklet was evaluated based on the results of expert assessments. The material expert validation received an average score of 96%, categorized as "very valid," while teaching material experts provided a rating of 94%, also categorized as "very valid." Practical validation by science teachers yielded a score of 93%, placing it in the "very practical" category. Additionally, the student trials resulted in an average score of 98%, indicating a "very good" assessment. These results collectively affirm that the developed teaching material is suitable for use. The effectiveness of the booklet in enhancing students' scientific literacy was further supported by the Paired sample t-test analysis, which demonstrated a significant improvement, with a test result of 0.000. This indicates that the booklet has a positive impact on improving students' scientific literacy.

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