



Development of a Quran-Integrated Science Module to Empower the Religious Attitudes of Seventh-Grade Students in Ecology Material

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ABSTRACT

This study aims to develop a Quran-integrated science module to empower the religious attitudes of seventh-grade students in ecology material. The research employed a Design-Based Research (DBR) approach using Reeves' model, which consists of four stages: problem identification, design, iteration, and reflection. A total of 85 seventh-grade students from SMP Al Aqhar Syifa Budi Solo and SMPIT Insan Mulia Surakarta were selected through random sampling and divided into control and experimental groups. Data analysis techniques included descriptive analysis for module feasibility based on expert validation, N-Gain score analysis to measure learning improvement, and an independent sample t-test to evaluate module effectiveness. The expert validation results showed a score of 88.8%, indicating the module's high validity. Teacher and student responses toward the module were very positive, with scores of 90.35% and 94.29%, respectively. The independent sample t-test results revealed a significant difference ($p < 0.05$) in students' religious attitudes between the experimental and control groups, where students using the module showed higher religious attitudes. Additionally, the N-Gain analysis indicated a moderate improvement, with values of 0.37 for the experimental class and 0.32 for the control class. Based on these findings, it can be concluded that the developed Quran-integrated science module is both feasible and effective in empowering students' religious attitudes.

Keywords: *integrated Quran, religious attitude, science module,*

INTRODUCTION

The current implementation of the Merdeka Curriculum emphasizes the cultivation of student behavior aligned with the values outlined in the Pancasila Student Profile. This profile encompasses six dimensions: (1) faith in and devotion to God Almighty with noble character, (2) independence, (3) mutual cooperation, (4) global diversity, (5) critical reasoning, and (6) creativity (Kemendikbudristek, 2022). The first dimension—faithfulness, devotion to God Almighty, and noble character—is closely related to the development of religious attitudes. Schools, particularly Islamic-based institutions, play a crucial role in shaping students' moral behavior by instilling religious values to foster individuals with strong religious character. Religious attitude is a vital aspect that must be nurtured to guide students in behaving according to Islamic teachings, encompassing cognitive elements (thoughts or beliefs about the attitude object), emotional elements (feelings toward the attitude object), and behavioral elements (actions toward the attitude object) based on the Quran and Hadith (Ihsan et al., 2021; Ok, 2016). Strengthening religious

attitudes in students can be achieved through an integration process, specifically by incorporating Islamic values into science learning through the Islamization of science. This integration illustrates that science is a manifestation of Allah's creation, reinforcing the connection between scientific knowledge and divine revelation.

The Islamization of science involves integrating modern scientific knowledge with an Islamic perspective, including its values and ethics (Madani, 2016; Sawaluddin et al., 2022). In practice, the Islamization of science is not merely the insertion of Quranic verses into specific scientific concepts, but rather establishing Islam as the foundational value system that underpins scientific inquiry. This integration process is complex, as science and religion belong to different epistemological domains. Science emphasizes logic and empirical evidence, often excluding revelation as a valid source of knowledge and rarely addressing God's role in the workings of the universe. In contrast, Islam is rooted in dogma, relies on religious texts, and emphasizes God's role as the Creator and Sustainer of all events and processes (Azmi & Nadia, 2022; Samsul, 2023).

Islamic-based schools, including madrasahs and integrated Islamic schools, introduce students to Islamic values alongside general knowledge, typically with a curriculum composition of 70% general subjects and 30% religious subjects. While general subjects convey modern science, religious subjects nurture Islamic values, which become embedded within the school culture. Instilling Islamic values through learning activities fosters students' religious attitudes, which are based on Islamic teachings and the example set by the Prophet Muhammad, encompassing honesty (*shidiq*), trustworthiness (*amanah*), effective communication (*tabligh*), and intelligence (*fathanah*) (Fuadi & Suyatno, 2020; Kartika et al., 2023; (Mariyono et al., 2023; Taja et al., 2021).

One method of empowering students' religious attitudes is the use of learning media that incorporate Islamic values. Such media integrate general scientific knowledge with Islamic teachings, reinforcing learning with relevant Quranic verses and Hadith, and highlighting signs of Allah's power through scientific phenomena (Mustafa et al., 2020; Purwati et al., 2018). However, field evidence reveals a persistent dichotomy in science learning at Islamic-based junior high schools (SMP/MTs). Although science subjects are taught, they are often not integrated with Islamic teachings, resulting in students' limited ability to relate natural phenomena to Quranic messages. Research conducted at SMP Plus Darus Sholah (Fajar & Izzah, 2023) and MTs Nurul Huda Tempos (Rahmayani et al., 2022) revealed that science textbooks used did not incorporate Quranic verses and Hadith. Similarly, Sari et al. (2022) found that science instruction at MTs in Padang City had not yet integrated Islamic values into teaching materials.

Based on these findings, it is evident that current teaching materials in Islamic-based schools have not sufficiently embedded Islamic values to foster students' religious attitudes. Therefore, this study aims to develop a Quran-integrated science module to empower the religious attitudes of seventh-grade students in ecology topics.

METHODOLOGY

The type of research employed in this study is Design-Based Research (DBR). This study aims to develop a Quran-integrated science module to empower the religious attitudes of seventh-grade students in Islamic-based schools. The DBR approach in this study follows Reeves (2006) development model, which consists of four phases: problem identification, design, iteration, and reflection. The instruments used for data collection included observation sheets, interviews, and questionnaires. Data analysis during the development phase was conducted descriptively, both quantitatively and qualitatively. The analysis techniques used included descriptive analysis to

determine the module's feasibility through expert validation, N-Gain score analysis, and effectiveness analysis to assess the module's impact on the targeted variables using a t-test. The research sample consisted of seventh-grade students from SMP Al Azhar Syifa Budi Solo and SMPIT Insan Mulia Surakarta during the even semester of the 2023/2024 academic year. The sampling technique used was random sampling, with 85 students assigned to both the control and experimental classes.

Expert validation was carried out by three experts specializing in media, language, content, and learning. Validation was conducted by providing validation sheets using a Likert scale ranging from 1 to 4. The assessment categories included: 4 (very relevant/very good), 3 (relevant/good), 2 (less relevant/less good), and 1 (not relevant/not good). This scale allowed flexibility for validators in evaluating the developed module. Validation data were then analyzed using an average score formula to produce a validation percentage. This percentage was used to determine the module's feasibility, with criteria as follows: 85.01–100.00% (very valid), 70.01–85.00% (valid), 50.01–70.00% (less valid), and 10.00–50.00% (invalid).

A readability test was conducted to assess teachers' and students' responses to the developed module through questionnaires using a Likert scale, followed by calculation of the average percentage. The average scores from teacher and student response questionnaires were then converted into qualitative data according to established criteria. The module qualification criteria based on the percentage of assessment are presented in Table 1.

Table 1. Module Eligibility Criteria

Percentage (%)	Criteria
90 - 100	Very Good
75 - 89	Good
65 - 74	Enough
55 - 64	Not Good Enough
0 - 54	Not Good

(Hadiyanti et al., 2021)

The study generated pretest and posttest data. The pretest and posttest results were analyzed for normality using the Kolmogorov-Smirnov test and for homogeneity using Levene's Test, both conducted with IBM SPSS 25 software. Normality and homogeneity tests were performed to determine whether the data were normally distributed and homogeneous. To analyze the module's effectiveness in influencing students' religious attitudes—which encompass four indicators, namely shidiq (honesty), amanah (trustworthiness), tabligh (eloquence in conveying God's message to ensure it is easily accepted), and fathanah (intelligence)—an independent sample t-test was performed. Furthermore, the improvement in students' religious attitudes before and after the use of the module was analyzed using the N-Gain score. The N-Gain score was calculated using the following formula:

$$N\text{-gain} = \frac{\text{posttest scores} - \text{pretest scores}}{\text{maximum score} - \text{pretest scores}}$$

(Hake, 1999)

The classification of N-Gain is based on the N-Gain score or the percentage of the N-Gain score. The N-Gain score will then be interpreted according to its category. The interpretation of N-Gain can be seen in Table 2.

N-gain Score	Interpretation
$g > 0,7$	High
$0,3 \leq g \leq 0,7$	Medium
$g < 0,3$	Low

RESULT AND DISCUSSION

Problem Identification

At this stage, problem identification was conducted through observations and interviews with teachers and students at two Islamic-based schools in Surakarta, namely SMP Al Azhar Syifa Budi Solo and SMPIT Insan Mulia Surakarta. Based on observations of learning activities and interviews with science teachers and students at these schools, it was found that learning is still carried out separately between general knowledge subjects and Islamic values. Furthermore, modules that integrate Islamic values into science learning have not yet been utilized, resulting in the suboptimal development of students' religious attitudes. Students also reported that they had not yet experienced the integration of Quranic teachings with science subjects. The findings from the problem identification stage concluded that there is a need for an alternative learning medium in the form of a module that integrates Islamic values into the subject matter to strengthen students' religious attitudes. The module expected by students should feature numerous images, concise and easy-to-understand material, appealing illustrations and colors, clear connections between scientific content and Islamic values, and should be designed for independent use.

Design

At the design stage, a Quran-integrated science module was developed as a solution to the identified problem. The module design refers to the Merdeka Curriculum and aligns with the module's purpose of empowering students' religious attitudes by integrating Islamic values with indicators of religious attitudes. The module is designed to be attractive and consists of three main sections: the opening section, the content section, and the closing section. The opening section includes a preface, table of contents, concept map, and usage instructions. The content section presents learning activities, material explanations, scientific facts, and Islamic discussions. The closing section contains a summary, evaluation, bibliography, and glossary. The material presented in the module is adapted from various sources, including junior high school science textbooks, ecology references, and relevant research journals as illustrated in Figure 1.



Figure 1. Module Product Display

Iteration



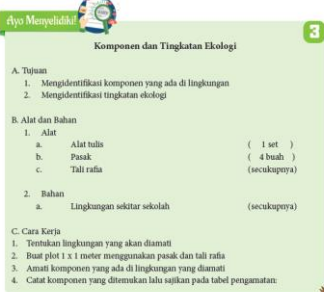

The iteration stage involved three main processes: expert validation to determine the feasibility of the developed module, small-scale trials to assess the responses of teachers and students, and large-scale trials to evaluate the module's effectiveness in empowering religious attitudes. After that, expert validation was conducted to assess the feasibility of the module to ensure its suitability for use in subsequent stages (Kholis et al., 2020). This process involved three expert lecturers who evaluated the module across four aspects: media, language, content, and learning. The validation process employed a Likert scale ranging from 1 to 4. The results of the validation, presented as percentage scores, were used to determine the module's feasibility category. Additionally, suggestions, recommendations, and feedback were collected to identify the strengths and weaknesses of the developed module, which served as the basis for revisions and improvements. The results of the expert validation are presented in Table 3.



Table 3. Percentage of Expert Validation Result

Rated Aspect	\bar{x}	Percentage (%)	Category
Media	3,6	88,8	Very Valid
Language	3,3	83,3	Valid
Material and Learning	3,6	90,3	Very Valid
Average	3,6	87,5	Very Valid

Based on Table 3, it can be seen that each assessed aspect obtained percentage scores of 88.9%, 83.3%, and 90.3%, with an overall average score of 87.5%. These results indicate that the developed module is categorized as valid and suitable for use. In addition to the percentage scores, suggestions and recommendations for module improvement were also obtained from the validators. These inputs were used to revise the module before proceeding to the large-scale trial. The details of the revisions made based on validator feedback are presented in Table 4.

Table 4. Expert Validation Revision Result

Findings	Revision
The phrase "Based on PBL and Containing Islamic Content" on the cover should be in one font and emphasized	The phrase "Based on PBL and Containing Islamic Content" on the cover was made into one font and has been improved
Add the faculty, university, and year to the cover	Faculty, university, and year information has been added
	
Layout in the "Let's Investigate" column is not neat	Layout in the "Let's Investigate" column has been improved
	

Findings	Revision
<p>Image captions overlap with images, and illustration images cover the text</p> <p style="text-align: center;">INTERAKSI ANTAR MAHKLUK HIDUP</p> <p>A. Interaksi antar komponen ekosistem Setiap makhluk hidup dalam suatu ekosistem memiliki tempat spesifik yang disebut habitat sehingga pada setiap tempat memiliki organisme khas yang tidak ditemui pada habitat lain. Setiap makhluk hidup saling berinteraksi jika ekosistemnya stabil. Interaksi antar komponen makhluk hidup pada suatu ekosistem meliputi kompetisi, predasi, herbivori dan simbiosis.</p> <p>1. Kompetisi</p>  <p>Kompetisi merupakan suatu interaksi yang terjadi diantara dua makhluk hidup dalam memenuhi kebutuhan hidupnya. Interaksi ini terjadi ketika dua organisme yang hidup di habitat yang sama saling bersaing untuk mendapatkan sumber daya yang sama dan terbatas. Kompetisi makhluk hidup terbagi menjadi dua</p> <p>Sumber: ptxabay.com</p> <p>12 Modul Ekologi dan Keanekaragaman Hayati</p>	<p>Image captions and illustration images have been corrected</p> <p style="text-align: center;">INTERAKSI ANTAR MAHKLUK HIDUP</p> <p>A. Interaksi antar komponen ekosistem Setiap makhluk hidup dalam suatu ekosistem memiliki tempat spesifik yang disebut habitat sehingga pada setiap tempat memiliki organisme khas yang tidak ditemui pada habitat lain. Setiap makhluk hidup saling berinteraksi jika ekosistemnya stabil. Interaksi antar komponen makhluk hidup pada suatu ekosistem meliputi kompetisi, predasi, herbivori dan simbiosis.</p> <p>1. Kompetisi</p>  <p>Kompetisi merupakan suatu interaksi yang terjadi diantara dua makhluk hidup dalam memenuhi kebutuhan hidupnya. Interaksi ini terjadi ketika dua organisme yang hidup di habitat yang sama saling bersaing untuk mendapatkan sumber daya yang sama dan terbatas. Kompetisi makhluk hidup terbagi menjadi dua</p> <p>Gambar 11. Kompetisi intraspesifik antar beruang Sumber: ptxabay.com</p> <p>12 Modul Ekologi dan Keanekaragaman Hayati</p>
<p>The right edge of the glossary, bibliography, and table of contents is not neat; make it justified</p>	<p>The glossary, bibliography, and table of contents have been justified</p>

Small-scale trials

Small-scale trials were conducted by administering questionnaires to three science teachers and 20 students at SMP Al Azhar Syifa Budi Solo and SMPIT Insan Mulia Surakarta. The purpose of the small-scale trials was to assess the responses of teachers and students toward the developed module before proceeding to large-scale testing. The results of the small-scale trials, expressed as scores from teachers and students, were converted into percentage categories to determine the module’s readiness for the next stage. The responses of teachers and students to the module are presented in Tables 5 and 6.

Table 5. Teacher Response Questionnaire Data

Aspect	\bar{x}	Percentage (%)	Category
Organization	3,50	87,50	Good
Readability	3,92	97,92	Very Good
Design	3,44	86,11	Good
Usefulness	3,50	87,50	Good
Islamic Content	4,0	100	Very Good
Average	3,61	90,35	Very Good

Table 6. Teacher Response Questionnaire Data

Aspect	\bar{x}	Percentage (%)	Category
Organization	3,8	95	Very Good
Readability	3,62	90,62	Very Good
Design	3,77	95	Very Good
Usefulness	3,71	92,5	Very Good
Islamic Content	3,87	96,87	Very Good
Average	3,77	94,29	Very Good

Based on the results of the small-scale trials, it was found that the responses of teachers and students to the module, assessed across five aspects, were categorized as very good, with average percentages of 90.35% and 94.29%, respectively. These results indicate that the Quran-integrated science module received highly positive feedback from both teachers and students, supporting its feasibility for progression to the large-scale trial stage.

Large-scale trials

Large-scale trials were conducted to determine the effectiveness of the developed module in empowering students' religious attitudes. The research design employed at this stage was a Quasi-

Experimental Design, involving a control class and an experimental class (Campbell & Stanley, 2015; Stratton, 2019). This phase produced pretest and posttest scores from both the control and experimental groups. The distribution of the pretest and posttest results is presented in Figure 2.

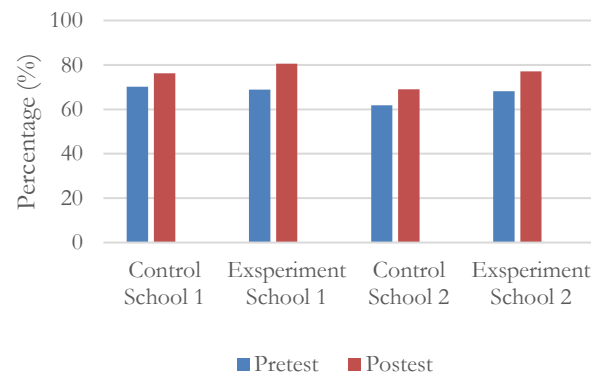


Figure 2. Distribution of Pretest and Posttest Results

Based on Figure 2, it can be observed that the pretest scores of both the control and experimental classes from each school were relatively good. This is attributable to the fact that the research sites, as Islamic-based schools, had already implemented Islamic character reinforcement, although not through teaching materials explicitly containing Islamic content. The reinforcement was carried out by directly relating Islamic values to the subject matter during instruction. Following the intervention, the posttest results demonstrated an improvement in Islamic character. The improvement across each indicator suggests that the module containing Islamic content, such as Quranic verses related to ecology, was effective in empowering students' Islamic character. These findings indicate that the empowerment of Islamic character can be further enhanced by integrating Islamic values into other relevant subject areas. To ensure the validity of the data analysis, normality and homogeneity tests were conducted on the pretest and posttest scores of both the control and experimental classes. The normality test was performed using the Kolmogorov-Smirnov test, while the homogeneity test was conducted using the Levene's test, as presented in Table 7.

Table 7. Normality and Homogeneity Test Result

School	Test	Class	Result (α)	Conclusion	
SMP Al Azhar Syifa Budi Solo	Normalitas (Kolmogorov-Smirnov)	Pretest	Experiment	0,200	Normal
		Posttest		0,200	Normal
		Pretest	Control	0,200	Normal
		Posttest		0,99	Normal
	Homogenitas (Levene-Test)	All Classes	0,675	Homogen	
SMP IT Insan Mulia Surakarta	Normalitas (Kolmogorov-Smirnov)	Pretest	Experiment	0,067	Normal
		Posttest		0,200	Normal
		Pretest	Control	0,104	Normal
		Posttest		0,200	Normal
	Homogenitas (Levene-Test)	All Classes	0,248	Homogen	

The results of the normality and homogeneity tests, as shown in Table 7, indicate that the pretest and posttest data from both the control and experimental classes were normally distributed and homogeneous, as evidenced by significance values greater than 0.05 ($\alpha > 0.05$). After confirming that the data met the assumptions for parametric analysis, an Independent T-Test was conducted using SPSS 25 software. The Independent T-Test was performed to determine whether

there were significant differences in religious attitudes between the group that used the module and the group that did not. The results of the Independent T-Test for religious attitudes are presented in Table 8.

Table 8. Religious Attitude T-Test

School	Class	T-Test	Conclusion
SMP Al Azhar Syifa Budi Solo	Experiment Control	0,027	H ₀ rejected
SMPIT Insan Mulia Surakarta	Experiment Control	0,000	H ₀ rejected

Based on the statistical results of the independent sample t-test presented in Table 8, the sig. (2-tailed) values were 0.027 and 0.000, leading to the rejection of the null hypothesis (H₀). This indicates that there is a significant difference in the average religious attitudes between the control and experimental classes. The religious attitudes of the group that used the module were significantly higher compared to the group that did not use the module.

Table 9. N-Gain Score in Control and Experimental Classes

School	Class	N-gain	Category
SMP Al Azhar Syifa Budi Solo	Experiment Control	0,37 0,18	Medium Low
SMPIT Insan Mulia Surakarta	Experiment Control	0,32 0,16	Medium Low

Table 9 presents the N-Gain results for each variable. The N-Gain values for the control and experimental classes reveal distinct differences, with the experimental class showing a higher N-Gain value compared to the control class.

Reflection

Reflection and implementation were carried out through further discussions with education experts and practitioners regarding the Quran-integrated science module after a series of tests. As a follow-up, the module will be disseminated to a wider range of schools for implementation in learning. The results from the tests conducted indicate that the Quran-integrated module is effective in empowering students' religious attitudes. The integration of Islamic values within the module allows students to approach the material not only from a scientific perspective but also through a broader lens, connecting real-world issues with religious teachings. This approach enables students to apply their learning in daily life. The module, enriched with Islamic content, plays a significant role in fostering an active and religious learning environment, encouraging students to develop a religious attitude in line with their faith in God Almighty.

These findings align with research by Maulidan et al. (2023), which demonstrated that an integrated Quran-based science module on the human circulation system effectively empowered students' religious attitudes, with 89% of students categorized as "religious." Similarly, Choirudin et al. (2021) found that a Quran and Hadith-based mathematics module significantly shaped students' religious attitudes. It is essential to further empower students' religious attitudes by integrating Quranic verses and Hadith not only with one subject but also across various relevant disciplines.

CONCLUSION

Based on the results of the conducted research, it can be concluded that the module is valid and suitable for use, with a validity percentage of 88.8%. The responses from both teachers and students were highly positive, with average response rates of 90.35% and 94.28%, respectively. The large-scale trials indicated that the module is effective in fostering students' religious attitudes, as shown by a significant difference between the control and experimental classes. The religious attitudes of the group using the module were notably higher compared to those of the group not using the module, with average N-Gain scores of 0.37 and 0.32, respectively, both indicating moderate improvement. The practical implication of this study lies in the development of a module integrated with Islamic content, which aligns with the Pancasila student profile in the Merdeka Curriculum, specifically fostering faith in and devotion to God Almighty, as well as the cultivation of noble character. However, this study has a limitation: the module was only tested on seventh-grade students and was focused solely on ecology as the subject matter.

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