



Development of Integrated Learning Supplements on Islamic Values for Reproductive System Materials to Enhance Critical Thinking Skills and the Religious Character of MA Students

Yuliati Khasanah✉, Lisdiana Lisdiana, Sigit Saptono, Ellianawati Ellianawati

DOI: <http://dx.doi.org/10.15294/usej.v13i1.30393>

Universitas Negeri Semarang, Indonesia

Article Info

Submitted 2025-09-13

Revised 2025-10-20

Accepted 2025-12-15

Keywords

Critical thinking; Learning supplements, Reproductive system; Religious character, integration of Islamic values

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Abstract

Education not only emphasizes cognitive aspects and critical thinking skills but also character formation and the internalization of moral values. One of the main challenges for Madrasah Aliyah is to integrate Islamic values into science learning so that students excel intellectually and have a strong religious character. This research aims to develop a valid and effective learning supplement that integrates Islamic values for use in reproductive system materials to strengthen students' critical thinking abilities and religious character. This research uses the ADDIE development model (Analyze, Design, Development, Implementation, and Evaluation), with data collected through interviews, observations, questionnaires, and tests (pre-post). The supplement was analyzed by experts in content and media and was tested on students from class XI IPA1 and XI IPA2 at MAN 2 Semarang and MAN Salatiga. Data analysis techniques used descriptive analysis and statistical data analysis. This supplement is declared very valid by media experts (93.37%) and material experts (95.49%), with a high readability level (88.18%). Strengthening critical thinking skills is shown through the N-Gain analysis per indicator with an average score of 0.82 (high category) and the religious character of students is indicated through the N-Gain analysis per indicator with an average score of 0.82 (high category).

How to Cite

Khasanah, Y., Lisdiana, L., Saptono, S., & Ellianawati, E. (2025). The Effectiveness of the STEM Integrated PBL Model on Science Collaboration and Problem-Solving Skills. *Unnes Science Education Journal*, 14(3), 483-489.

INTRODUCTION

Education in the 21st century demands students to not only master cognitive aspects but also possess critical thinking abilities and strong moral character. Madrasah Aliyah, as an educational institution based on Islamic values, has a strategic role and dual responsibility, namely to nurture a generation that is not only intellectually superior but also possesses moral integrity and noble character (Hamzah, Soraya, & Kurjum, 2025). Although Islamic values education has become an integral part of the curriculum, in reality, many students still have not fully been able to apply those values in their daily lives. Students' critical thinking skills in facing global challenges are also still relatively low.

In the framework of the National Curriculum, critical thinking is positioned as a key competency through the Higher Order Thinking Skills (HOTS) approach. However, the implementation of learning in Madrasah Aliyah is still limited to textual material that is less relevant to the students' life context. In addition, the learning process has not fully reflected the integration between science and Islamic teachings comprehensively, both in the aspects of science and social studies (Nurkhasanah, 2023). This situation leads to a low awareness among students in seeing the relationship between the knowledge being studied and the underlying values of faith.

According to Ay et al. (2015), critical thinking includes the ability to identify problems, classify relevant information, consider various conditions, formulate hypotheses, and assess the validity of a result. This indicates that critical thinking skills can train students to become exceptional individuals in the future, where students can continue to grow and improve themselves. Critical thinking skills play an important role in the intellectual and emotional development of learners. Redhana (2019) states that these skills are crucial because they support students' ability to face real problems in an analytical and reflective manner. Dores et al. (2020) add that critical thinking is necessary for making wise and responsible decisions. In addition to covering the processes of problem identification and information analysis, these skills also train students to be aware of the weaknesses and strengths of their own thinking, which then becomes the foundation for independently improving their mindset (Smetanová et al., 2015). Critical thinking skills can be seen from the active interaction of students and how students use their cognitive abilities to apply new ideas (Agboeze & Ugwoke, 2013).

The results of observations conducted at

MAN 2 Semarang indicate that biology learning has not fully integrated Islamic values that can train critical thinking skills and strengthen character building. This is due to the lack of teaching materials that contain religious values, hence there is a need for teaching materials on the reproductive system integrated with Islamic values, which should be prepared by teachers to support education. Yana (2023) shows that an integrated thematic module with Islam can significantly improve student learning outcomes and religious character. Rengganis (2024) reveals that the application of the discovery learning model, which includes the elements of Islamic fiqh values, is effective in fostering critical thinking skills among students at the Madrasah Aliyah level.

Learning activities cannot be separated from learning materials that are in accordance with curriculum references. Integrated learning supplements that embody Islamic values are very important to be developed. This supplement serves as an additional media to enrich the teaching materials and strengthen the connection between scientific concepts and religious values. The development of learning supplements that integrate Islamic values in the material of the reproductive system can be an alternative. Research shows that an integrative approach between Qauliyah verses (revelations) and Kauniyah verses (nature) in biology material can significantly improve students' critical thinking skills and religious attitudes (Indri, 2025). Learning supplements such as modules, e-booklets, and Islamic-based worksheets have been developed with positive results in enhancing reasoning abilities and forming the religious character of Madrasah Aliyah students (Julia, 2023; Saputri, 2025).

Biology learning that is separate from religious values poses a risk of creating a spiritual void and a lack of moral control. Therefore, the development of teaching materials or learning supplements that are integrated with Islamic values becomes very important so that students not only master scientific concepts, but also internalize morals and ethics in understanding biological phenomena, including the reproductive system (Fadhila, 2021). Critical thinking skills are essential in studying the reproductive system so that students can analyze various contemporary issues such as promiscuity, abortion, or reproductive health within the framework of Islamic values. Syafitri (2023) states that socio-scientific based teaching media integrated with Islam can sharpen students' arguments and critical thinking in facing real problems in society.

The quality of the learning media created significantly influences the success of the learn-

ing product itself (Irawan & Hakim, 2021). One indicator that the media is of high quality is its level of validity, practicality, and effectiveness. Validity in the context of research refers to how trustworthy the results obtained are, which greatly depends on the applied research methods. A high level of readability will help increase learning interest, strengthen memory, speed up the reading process efficiently, and encourage readers to build consistent reading habits (Zidatunnur & Rusilowati, 2021). The effectiveness indicator is the ability to significantly improve learning outcomes (Haeriyah & Pujiastuti, 2022).

METHOD

Research Design

This research and development method uses the Analysis, Design, Development, Implementation, and Evaluation (ADDIE) model developed by Robert Maribe Branch (2009) in (Sugiyono, 2016). This research is at the implementation stage of small-scale and large-scale trials. The analysis in first stage aims to identify the needs in biology learning. The design in the second stage aims to design product, prepare validation sheets, readability media questionnaires, pretest and posttest questions, as well as religious character strengthening questionnaires. The development in third stage aims to determine the validity of the developed product. The implementation in fourth stage aims to assess the readability of the media (small-scale trial) using questionnaires and test the effectiveness on a larger scale.

Population and Sample

The research was conducted in February of the academic year 2023/2024. The population for the small-scale research consists of 12th-grade students of MAN 2 Semarang with a sample size of 20 individuals, while the research for the large scale involves 11th-grade science students from MAN 2 Semarang and MAN Salatiga with a total sample size of 139 students.

Instrument

The instruments used in the research to develop an integrated learning supplement with Islamic values on the reproductive system material consist of expert validation sheets for media and materials, readability questionnaires for media, questionnaires for strengthening religious character, as well as pre-test and post-test questions.

Procedure

The data collection techniques used in this research are through interviews, questionnaires,

pre-tests, and post-tests. The results of this study are the validity and readability of the media and the effectiveness of integrated learning supplements on Islamic values in strengthening the critical thinking skills and religious character of MA students. The research was conducted based on solutions from the results of interviews conducted by Biology teachers at MAN 2 Semarang.

Data Analysis Techniques

The data analysis in this study uses descriptive analysis and statistical data analysis. The assessment scale on the questionnaire uses a Likert scale (1-5). Validity analysis construct validation by 5 assessors according to the formula.

$$\text{Validity value} = \frac{\text{score obtained}}{\text{Total score}} \times 100\% \quad (\text{Sudijono, 2009})$$

The criteria for product validity testing have a percentage range in Table 1.

Table 1. Criteria for Product Validity, Test Questions, and Religious Character Strengthening

Percentage	Criteria
$81.25\% < P \leq 100\%$	Very valid
$62.5\% < P \leq 81.25\%$	Valid
$43.75\% < P \leq 62.5\%$	Less valid
$25\% < P \leq 43.75\%$	Not valid

Readability analysis of the media used classical analysis with the formula.

$$P = f/N \times 100\%$$

Table 2. Criteria for Media Readability

Percentage	Criteria
$81.25\% < P \leq 100\%$	Very practis
$62.5\% < P \leq 81.25\%$	Practis
$43.75\% < P \leq 62.5\%$	Less Practis
$25\% < P \leq 43.75\%$	Not Practis

An analysis of strengthening critical thinking skills and religious character using N-Gain criteria. The formula for the g factor.

$$g = \frac{\text{Skor Posttest} - \text{Skor Pretest}}{\text{Skor Maks} - \text{Skor Pretest}} \times 100\% \quad (\text{Hake, 1999})$$

Table 3. Interpretation Criteria for Gain Values

Value g	Criteria
$g > 0.7$	High
$0.7 > g \geq 0.3$	Currently
$0.3 > g > 0.0$	Low
$g = 0.0$	Equal

(Hake, 1999)

RESULT AND DISCUSSION

The development of integrated learning supplements with Islamic values for the reproduction system material to enhance students' critical thinking skills and religious character is conducted based on the ADDIE development model. The findings of this research are limited to the validity and readability of the learning supplements, strengthening critical thinking abilities, and reinforcing religious character that can be applied in Biology learning at MA/SMA. The validity results by 5 validators in Table 4.

Table 4. Assessment of Media Validation Results

Aspects	Average (%)	Criteria
Supplement size	90.00	Very valid
Cover Design	94.28	Very valid
Content design	95.83	Very valid
Avarage	93.37	Very valid

Based on Table 4, the media validation assessment by media experts shows an average result of 93.37% for each aspect of the evaluator agreement assessment, which is categorized as very valid. Validation of the cover design and content design in learning supplements is very important to ensure visual quality, readability, and appeal of the developed learning supplements. This process helps ensure that the media is not only suitable in terms of content material but also effective in conveying messages visually and attracting students' interest in learning. This is supported by the research of Rahmawati & Lisdiana (2023) that an attractive content and cover design can enhance students' perception of the media's usefulness. Additionally, the material validation assessment can be seen in Table 5.

Table 5. Results of the Material Validation

Assessment Aspects	Average Score (%)	Criteria
Content Feasibility	95.93	Very valid
Presentation		
Language Feasibility	95.76	Very valid
Presentation Feasibility	93.88	Very valid
Integration of Islamic Values	96.42	Very valid
Avarage	95.49	Very valid

Based on Table 5, the expert material validation assessment shows an average of 95.49%

for each aspect of the evaluator's agreement assessment, falling into the very valid category. The research by Li et al. (2023) and Maryana et al. (2024) emphasizes that the validation of learning materials includes the accuracy of the linguistic structure in accordance with the General Guidelines for Indonesian Spelling (PUEBI). In addition, the language used must be communicative, engaging, and easy to understand. The diversity of materials must also be relevant to the learning topic and the education level of the students. In the context of this research, the materials used come from the topic of biology, specifically in the chapter on the reproductive system. The materials are organized progressively, starting from simple concepts to complex ones, from what is already known to what is yet to be discovered, as suggested by Wardhani et al. (2022). The conclusion from the results of media validation and material validation is that the developed integrated learning supplement is very valid to be applied in the next phase of research. The results of the media readability test can be seen in Table 6.

Table 6. Results of Media Readability Analysis

Assessment Aspects	Average Score (%)	Criteria
Interest	89.21	Very good
Content	87	Very good
Language	88.33	Very good
Average	88.18	Very good

Based on Table 6, the results of the media readability analysis from the small-scale trial obtained a score with an average of 88.18%, which falls into the very good category. Based on the results of the media readability analysis on the small-scale trial reviewed from all aspects including interest, content, and language, it received an average score of 88.18%, which is also categorized as very good, thus this learning supplement can be implemented on a large scale. The readability analysis consists of 3 indicators: (1) interest, (2) content, and (3) language. Learning supplements that do not consider the readability level have the potential to cause confusion, decrease student learning motivation, and ultimately hinder the achievement of targeted competencies.

Readability is an important aspect in the preparation of teaching materials, especially in biology learning that is linked to Islamic values. When biology material is paired with Islamic teachings, readability becomes the key to conveying scientific messages without diminishing their religious meaning. Furthermore, the informati-

on conveyed can be accepted optimally, thereby enhancing students' critical thinking skills and religious character. The results of this study are supported by the research of Rahmadini (2024), which shows that the integrated concept module of NAPZA with Islamic values indicates that readability analysis is very important in developing students' critical thinking skills. The development of an Islamic-based physics magazine, readability is identified as one of main indicators of success of teaching media in conveying spiritual values.

The integrated learning supplement product with Islamic values that has been validated is subsequently implemented to determine the strengthening of students' critical thinking skills. The instruments used are pre-test and post-test question sheets. The data from the pre-test and post-test used in the study are analyzed using N-Gain. The improvement in critical thinking skills before and after using integrated learning supplement with Islamic values can be seen in Table 7.

Table 7. Results of Students' Critical Thinking Ability Analysis

Indicator	Average Score			Criteria
	Pretest	Posttest	N-Gain	
Concluding	36.09	90.17	0.85	High
Providing simple explanations	40.13	89.37	0.82	High
Building basic skills	37.34	89.67	0.84	High
Organizing strategies and tactics	31.02	86.09	0.80	High
Giving further explanations	35.76	88.49	0.82	High

The indicator with the highest improvement is shown in the ability to summarize with an N-Gain of 0.85 (high category), which means that students are increasingly able to draw logical conclusions based on the information available. This indicates that the provided learning can foster students' analytical and synthesis skills in understanding the material. Other indicators, such as providing a simple explanation N-Gain 0.82 and providing further explanation N-Gain 0.82, show that students not only understand the information but are also able to convey it back in an easily understandable language and add elaboration

based on their own understanding. The indicator for setting strategies and tactics has significantly increased with an N-Gain value of 0.80, indicating that students' ability to plan problem-solving approaches has improved significantly after the learning intervention. This is reinforced by research (Khoirunnisa & Sabekti, 2020) which states that in the strategy and tactics indicator, students can seek solutions to problems related to the given cases to determine the appropriate actions. This is in line with the Critical Thinking theory according to Ennis (1993), which states that critical thinking skills include analysis, evaluation, and drawing conclusions based on evidence.

Overall, from the five indicators, an average N-Gain of 0.82 (high category) was obtained. The uniform increase across all indicators indicates that the learning supplements integrated with Islamic values are not only effective in delivering the material but also in comprehensively developing critical thinking skills. This aligns with the concept of integrative learning proposed by Huber and Hutchings (2004), which emphasizes the importance of the integration between knowledge and values in the learning process. The research results show that the use of learning supplements containing Islamic values can significantly enhance students' critical thinking abilities. The strengthening of religious character after using integrated learning supplements of Islamic values can be seen in Table 8.

Table 8. Results of the Analysis of Strengthening Students' Religious Character

Indicator	Average score			Criteria
	Pretest	Posttest	N-Gain	
Dimension of Iman	55.16	92.12	0.82	High
Dimension of Islam	60.00	93.81	0.85	High
Dimension of Ihsan	39.84	88.85	0.81	High
Dimension of Knowledge	58.30	92.90	0.83	High
Dimension of Amal	58.02	91.92	0.81	High
Average N-Gain			0.82	High

Based on Table 8, there was a very significant increase between the pre and post survey scores in all indicators of religious character. The N-Gain scores in all dimensions show a high category. The dimension of Islamic faith achieved the highest N-Gain of 0.85, categorized as high,

followed by the knowledge dimension with an N-Gain of 0.83 and the faith dimension with an N-Gain of 0.82. The dimensions of Ihsan and deeds obtained the same N-Gain of 0.81. Strengthening religious character has become one of the main objectives in developing learning supplements that integrate Islamic values, especially in the material of the reproductive system. This supplement is not only designed to enhance cognitive understanding and critical thinking skills, but also to shape the spiritual and religious attitudes of students comprehensively. The Islamic dimension achieved an N-Gain of 0.85, the highest among other dimensions. This indicates that the integration of learning with Islamic teachings has been successfully translated in a scientific and religious manner, and positively influences students' attitudes. The integration of Islamic values in reproduction material is not only understood conceptually, but is also practiced.

High category (average N-Gain 0.82) in all aspects of religious character indicates that this approach not only enhances cognitive aspects but also affects and balances the students' spiritual development. This proves that the integrative approach can be a solution for moral-valued science education. Ayu, Triwoelandari, and Fahri (2019) emphasize that science learning that incorporates religious practices increases students' emotional and spiritual engagement. The higher the score, the better students are in practicing religious commands as a form of faith actualization. In line with research (Widodo, 2019), character education through this integrative approach reflects success in promoting social and personal piety. The development of integrated learning supplements of Islamic values in reproductive system material has proven to be highly effective in strengthening students' religious character.

CONCLUSION

Based on the research results, it can be concluded that the supplementary learning integrated with Islamic values on the reproductive system material developed is stated to be very valid based on the validity assessment by media experts with an average of 93.37% and by material experts with an average of 95.49%. The results of the media readability test obtained an average student response of 88.18%, categorized as very good. The supplement is stated to be effective in strengthening critical thinking skills and religious character with average N-Gain of 0.83 for both.

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