Integrating Islamic Values and Mathematical Communication Skills in Relations and Functions Module

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ABSTRACT

In Islamic-based schools, mathematics instruction should be supported by engaging modules that encourage independent learning and integrate Islamic values with mathematical communication skills, enabling students to convey mathematical ideas effectively. This study aims to develop a valid, practical, and effective mathematics module integrating Islamic values and mathematical communication skills for the topic of relations and functions, and to determine students' level of Islamic knowledge after its use. This research and development (R&D) study used the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation) and a one-shot case study design for effectiveness testing. Conducted at SMPIT Az-Zuhra Islamic School Pusat, the subjects included eighth-grade students and experts. Data were collected via validation sheets for instructional material experts, Islamic studies experts, and educational technology experts, along with practicality and Islamic knowledge questionnaires, and a posttest on mathematical communication skills. Data were analyzed using the Aiken index (validity), percentages (practicality and Islamic knowledge), and normality and one-sample Wilcoxon signed rank test (effectiveness). The module achieved a validity level of 0.83 (highly valid). Practicality reached 93.87% (small group) and 82.31% (limited group), both of which were categorized as highly practical. Posttest results showed that the students achieved a mean score of 79.01. The results of the One-Sample Wilcoxon Signed-Rank Test indicated a significance value of 0.214. Therefore, the null hypothesis was accepted, and the module was considered effective in meeting the learning objective achievement criteria, which was set at 78. Furthermore, students' Islamic knowledge fell into the "very good" category. Thus, the developed module is valid, practical, effective, and suitable for mathematics education.

I. Introduction

In learning activities, students not only receive material directly from the teacher but also acquire understanding through various other learning resources, including instructional materials. Instructional materials are a set of learning materials systematically arranged by considering learning objectives and student characteristics (Farhana et al., 2025), thereby assisting students in optimally understanding the material (Hartono & Dirgantoro, 2023).

Among the various forms of instructional materials, the module can be used for learning. This is because modules are generally structured concisely and are equipped with interconnected learning activities, allowing students to follow the learning flow more clearly (Triyono, 2021). Furthermore, according to Yuni & Afriadi (2020), the language used in modules is typically simple and to the point, making it easier for students to comprehend.

Modules are also recognized as instructional materials that can be used for independent learning Chuseri et al., (2021) explain that through modules, students can learn at their own pace without constantly relying on the teacher's explanations. This habit is essential because, according to Khaerunisha et al., (2025) independent learning can foster a sense of responsibility and self-confidence within students.

In its preparation, a module needs to be tailored to the school's needs and students' characteristics. This is a point of concern in Islamic-based educational institutions, such as Islamic schools, madrasas, and Islamic boarding schools (pesantren) (Amir et al., 2019). These institutions require instructional materials that not only convey scientific concepts but also instill Islamic values and shape noble character. Therefore, integrating Islamic values into the mathematics module is a relevant step to ensure that learning does not focus solely on cognitive aspects but also

on the character development of students who have faith and devotion to Allah SWT (Safitri et al., 2020).

The integration of Islam into education is an effort to combine knowledge with Islamic values so that the two form a cohesive whole within the learning process (Yusuf, 2022). This can be implemented by linking learning materials to activities or contexts relevant to Islamic teachings (Kusno et al., 2024), as well as by integrating Islamic values into various components of learning, such as the presentation of material, learning orientation, the provision of examples, exercises, practice, feedback, and follow-up (Darto & Afandi, 2022). The Islamic values that can be integrated include the values of faith (aqidah), Sharia (worship and social interactions), and ethics (akhlak), which aim to shape students' understanding and character (Yusuf, 2022; Kusno et al., 2024).

In the process of integrating science and Islam, Yusuf (2022) explains that three models of science-Islam integration can be used separately or in combination to connect scientific knowledge with Islamic values: al-Nuṣūṣ al-Shar'iyyah, which links science to the Qur'an and hadith; al-Tahlīl al-Īmānī, which connects scientific concepts with the values of faith and Sharia, and al-Naqd al-Islāmī, which critiques scientific theories that contradict Islamic doctrine. Through these three models, learning is not only oriented toward the mastery of knowledge but also toward the development of students' character, ethics, and responsibility in accordance with Islamic values.

The need for an Islamic-integrated module became increasingly apparent after researchers conducted discussions on January 24, 2025, with a mathematics teacher at an Integrated Islamic Junior High School in Pekanbaru. The discussion results indicated that learning still relies on textbooks that lack student appeal. Additionally, the dense school schedule often reduces classroom time, compelling students to study independently. However, the textbooks currently in use do not yet meet this need.

The integration of Islamic values has also not been consistently evident in the learning process. The textbooks used do not clearly incorporate Islamic values, and the learning process is not always linked to them. Consequently, the Islamic character, which should be the school's hallmark, has not been strongly evident in classroom learning activities. This condition indicates a gap between the goals of Islamic education and its actual implementation.

In addition, the students' initial test results indicate cognitive difficulties with the concepts of relations and functions. Most students still struggle to draw arrow diagrams correctly, distinguish between relations and functions in various forms of presentation, write function formulas accurately, and read and distinguish between linear and nonlinear function graphs.

In fact, the topic of relations and functions is a crucial concept that students must master, as it forms the foundation for studying advanced materials, such as linear equations, straight-line equations, and concepts in geometry (Septianingsih & Amelia, 2023). Additionally, the concepts of relations and functions are closely related to daily life, such as in financial calculations (Cahya & Warmi, 2020), economic analysis (Parida et al., 2024), and modeling in various scientific fields (Pratama et al., 2021).

Observing these conditions, an innovation in instructional materials is needed that is not only attractive and easy to understand but also capable of encouraging independent learning and aligning with the characteristics of Islamic education. One effort is to develop a mathematics module integrated with Islamic values for the topic of relations and functions.

In addition to integrating Islamic values, the developed module is also designed around mathematical communication skills, as this aligns with the difficulties students face. Ikhsan & Afriansyah (2023) state that this skill plays a role in helping students convey mathematical ideas through various representations, such as pictures, graphs, and algebraic expressions, as well as connecting real situations to mathematical models and expressing them orally or in writing. Melinda & Zainil (2020) add that mathematical communication skills also support students in thinking structurally, reflectively, and logically when studying mathematics.

According to Kusumah et al., (2020) indicators of mathematical communication skills are divided into three aspects: written mathematical communication, drawing, and mathematical expressions. The aspect of written mathematical communication (Written Text) is demonstrated through students' ability to present answers using their own words, create algebraic or written models, explain and ask questions related to the mathematical content being studied, discussed, or written, and construct arguments and generalizations. Meanwhile, the drawing aspect involves the ability to represent mathematical objects, diagrams, or images in mathematical ideas and vice versa. Finally, the mathematical expressions aspect is indicated by a person's ability to express mathematical concepts by translating everyday occurrences into mathematical language or symbols.

The importance of this skill is also reflected in the policy of the Ministry of Primary and Secondary Education through Decree Number 046/HKR/2025 concerning Learning Outcomes, which places it as one of the skills students need to possess (Badan Standar, Kurikulum, Dan Asesmen Pendidikan Kementerian Pendidikan Dasar Dan Menengah, 2025). Therefore, developing a module focused on mathematical communication skills is a relevant step toward achieving mathematics learning objectives.

Several previous studies have developed mathematics modules integrated with Islamic values across various topics, such as integers (Ariski et al., 2023), flat-sided 3D shapes (Prawito et al., 2020), and statistics (Usmadi et al.,

2022). Furthermore, some studies developed mathematics modules based on mathematical communication skills, such as the topic of counting rules (Aulia et al., 2020), rectangles (Saifiyah et al., 2017), and relations and functions (Ats-Tsauri et al., 2021). Although various studies have contributed to the development of mathematics education, most research still focuses on only one aspect, namely the integration of Islamic values or the development of mathematical communication skills. The development of instructional materials that integrate both aspects simultaneously remains relatively limited. In fact, these two aspects have the potential to complement each other in creating a more meaningful mathematics learning experience.

The integration of Islamic values can support the development of mathematical communication skills through the presentation of material and problems linked to Islamic contexts and values that are relevant to students' lives. Such contexts serve as stimuli that encourage students to ask questions, discuss, express opinions, explain problem-solving processes, and formulate logical conclusions (Nufus et al., 2021). Additionally, mathematical communication skills are influenced by factors such as learning motivation, interest, self-confidence, and the meaningfulness of learning (Suryawati et al., 2023). Therefore, integrating Islamic values into mathematics instruction can create a more meaningful learning experience by connecting mathematical concepts with spiritual and moral aspects relevant to students (Sari & Yuniati, 2025). This connection enhances students' engagement and self-confidence in communicating mathematical ideas, both orally and in writing, through the appropriate use of mathematical language, symbols, representations, and arguments.

This study aims to develop an Islamic-integrated mathematics module, based on the mathematical communication skills of junior high school (SMP/MTs) students, for the topic of relations and functions, that is valid, practical, and effective, and that can improve students' Islamic knowledge. The results of this study are expected to serve as a new reference in the field of mathematics education research, particularly regarding the integration of Islamic values in mathematics learning.

II. Method

A. Research Type and Development Model

This research is a Research and Development (R&D) study using the ADDIE development model. The ADDIE model is an instructional development framework systematically structured into five stages: Analysis, Design, Development, Implementation, and Evaluation (Sugiyono, 2021; Cahyadi, 2019; Silitonga et al., 2022; Rustandi & Rismayanti, 2021).

The ADDIE model was chosen because it is widely used in development research and provides a clear and structured workflow (Sohilait, 2021). Through this systematic process, researchers can develop instructional materials that meet students' needs and predetermined learning objectives (Adeoye et al., 2024; Pribadi, 2020). In addition, the ADDIE model emphasizes evaluation at every development stage, enabling potential errors and product weaknesses to be identified and minimized early, thereby optimizing the quality of the developed product.

B. Research Subjects and Objects

The subjects in this study consist of validators and eighth-grade students of SMPIT Az-Zuhra Islamic School Pusat. Validators include instrument experts, instructional material experts, Islamic studies experts, educational technology experts, and item experts. Students serve as research subjects to test the practicality and effectiveness of the developed module, and to assess the Islamic knowledge gained from its use. The object of this study is the developed Islamic-integrated mathematics module.

There were three validators in this study, consisting of two mathematics education lecturers and one mathematics teacher who possessed expertise and experience in the field of mathematics education. Meanwhile, the students participating in this study consisted of two classes of different genders selected from the four available classes, namely two classes of boys and two classes of girls. Class selection was conducted using probability sampling with cluster random sampling, in which each class was considered a single cluster and selected randomly within each group of boys and girls so that representation based on gender was maintained while upholding the principle of randomization.

C. Data Sources, Data Types, Data Collection Techniques, and Research Instruments

The data sources in this study are from students and experts who serve as validators. The collected data consists of quantitative and qualitative data. Quantitative data include the module's and its instruments' validity scores, the module's practicality level, students' Islamic knowledge, and results of the mathematical communication skill test. Meanwhile, qualitative data, including comments and suggestions from validators, serve as the basis for revising the module and instruments.

Data collection techniques were carried out using test and non-test methods. Non-test techniques were used to obtain data via module validation sheets, practicality questionnaires, and Islamic knowledge questionnaires. The test technique was used to collect data on students' mathematical communication skills via an essay test administered after completing the module. The research instruments utilized include module validation sheets, practicality questionnaires, Islamic knowledge questionnaires, and mathematical communication skill test items.

D. Data Analysis Techniques

Data analysis in this study encompasses the evaluation of product validity, practicality, and effectiveness, as well as students' Islamic knowledge. Validity analysis was conducted to determine the module's validity level using expert assessments. Scores from each validator were analyzed using Aiken's V index with the following formula (Astuti et al., 2024).

$$V = \frac{\Sigma S}{n(c-1)}$$

Here $S = r - l_0$, where r does the validator give the score, l_0 is the lowest score, n is the number of validators, and c is the highest score. The validity index is interpreted using the following criteria: highly valid if $V > 0.80$, valid if $0.40 < V \leq 0.80$, and less valid if $V \leq 0.40$ (Retnawati, 2020).

A practicality analysis was conducted to assess the ease of use of the developed module. The practicality level was calculated using the percentage formula as follows (Riduwan, 2019).

$$P = \frac{Total\ score\ obtained}{Maximum\ score} \times 100\%$$

The practicality percentage is interpreted using the criteria: highly practical if $80 \leq P \leq 100$, practical if $60 \leq P < 80$, moderately practical if $40 \leq P < 60$, less practical if $20 \leq P < 40$, and not practical if $0 \leq P < 20$, where P represents the practicality percentage (Hilda et al., 2021).

Effectiveness testing was conducted to assess the module's performance. This study employed a one-shot case study design, meaning one experimental group is given the treatment and measured once post-treatment (Lestari & Yudhanegara, 2018). The choice of the One-Shot Case Study design was based on the key characteristics of research and development (R&D). Unlike purely experimental research, which focuses on comparing the effects of different methods, the primary focus of this study is to test whether the designed module functions optimally and helps the target group meet specific completion criteria. Module effectiveness is determined by students' posttest scores on mathematical communication skills after using the module.

Before the hypothesis test was conducted, the posttest scores were first analyzed using a normality test applied via the Kolmogorov-Smirnov method, as this method is commonly used when the sample size is large and/or exceeds 50 respondents (Nahda et al., 2025). The results of the normality test determine the type of hypothesis analysis used. If the data are normally distributed, the test is conducted using a one-sample t-test. Conversely, if the data are not normally distributed, the test is conducted using a one-sample Wilcoxon signed-rank test to determine whether the students' learning outcomes have met the learning objective achievement criteria of 78.

Furthermore, data on students' Islamic knowledge were collected through a questionnaire administered after completion of the module. The data were analyzed using the percentage formula as follows (Sugiarto, 2015)

$$I = \frac{Total\ score}{(Highest\ score \times Number\ of\ respondents)} \times 100\%$$

The percentage of Islamic knowledge is interpreted using the criteria: very good if $80 \leq I \leq 100$, good if $60 \leq I < 80$, fair if $40 \leq I < 60$, poor if $20 \leq I < 40$, and very poor if $0 \leq I < 20$, where I represents the percentage increase in students' Islamic knowledge (Sugiarto, 2015).

E. Posttest Instrument and Scoring Rubric

The posttest instrument for mathematical communication skills in this study consisted of six items based on three indicators: restating a mathematical description in one's own words (Written Text); modeling situations using drawings, graphs, or algebraic expressions (Drawing); and representing real-world objects, situations, and everyday events as mathematical models and solving them (Mathematical Expression). These test items were then validated by experts and pilot-tested on ninth-grade students to assess their validity, reliability, difficulty level, and discriminating power. The results of the test suitability assessment are presented in Table 1.

Based on Table 1, only three items were used in the limited-group effectiveness test: Item 1 (Type B), Item 2 (Type A), and Item 3 (Type B). The selection of these three items was based on the results of the analysis of validity, reliability, discriminant validity, and difficulty level. In general, the three items met the eligibility criteria because they had good content validity, high reliability, and empirical validity in the high to very high categories.

Item 2 (Type A) and Item 3 (Type B) were selected because they have moderate difficulty levels and fairly good discriminative power. Meanwhile, Item 1 (Type B) was retained even though its discriminative power is lower than that of Item 1 (Type A). This decision was based on the need for variation in difficulty levels within the test as well as considerations of content validity. In essence, Item 1 of Type B is considered more appropriate because it incorporates Islamic values (akhlak) regarding the characteristics of the Prophet Muhammad, which are already familiar to the students. Additionally, the question has been revised to better align with the indicators of mathematical communication skills in the drawing component by presenting the relationship between the Prophet's characteristics and their meanings in the form of an arrow diagram.

Table 1. Results of the Item Analysis of the Posttest Instrument

Item	Content Validity	Empirical Validity	Reliability	Discrimination Index	Difficulty Level	Mathematical Communication Skill	Islamic Integration	Conclusion
Item 1 Type A	Very Valid	Valid / High	High	Fair	Easy	Drawing	Ethics (Akhlak)	Not Used
Item 2 Type A	Very Valid	Valid / Very High	High	Good	Moderate	Mathematical Expression	Islamic Law (Sharia)	Used Without Revision
Item 3 Type A	Very Valid	Valid / Very High	High	Fair	Moderate	Written Text	Islamic Creed (Aqidah)	Not Used
Item 1 Type B	Very Valid	Valid / High	High	Poor	Easy	Drawing	Ethics (Akhlak)	Used with Revision
Item 2 Type B	Very Valid	Valid / High	High	Good	Easy	Mathematical Expression	Islamic Law (Sharia)	Not Used
Item 3 Type B	Very Valid	Valid / Very High	High	Fair	Moderate	Written Text	Islamic Creed (Aqidah)	Used Without Revision

The assessment of mathematical communication skills in this study utilized a holistic scoring guide adapted from the Maryland Math Communication Rubric. A holistic rubric was chosen because it allows evaluators to comprehensively assess the quality of students' responses based on the accuracy, clarity, and completeness of the mathematical communication demonstrated in their answers. Through this approach, mathematical thinking skills and the ability to communicate mathematical ideas are assessed as a single, integrated whole, thereby providing a more authentic picture of students' mathematical communication skills. The scoring criteria based on the Maryland Math Communication Rubric are presented in Table 2.

Table 2. Holistic Scoring Rubric for Mathematical Communication Skills

Score	Student Response Criteria
0	No response is provided, or the response is illegible.
1	Attempts to answer the question, but the response is inappropriate or incorrect.
2	Uses mathematical language to explain operations, concepts, or procedures; however, most explanations are inaccurate, and only a small portion is correct.
3	Provides a complete explanation using appropriate mathematical language, but minor errors remain in the effectiveness, accuracy, or precision of communicating operations, concepts, and procedures.
4	Provides a complete and correct explanation using appropriate mathematical language and demonstrates a very high level of effectiveness, accuracy, and precision in explaining operations, concepts, and procedures.

The raw scores obtained by students on the posttest (with a maximum score of 12) are converted to a 100-point scale so they can be analyzed and compared with the learning objective achievement criteria. The conversion procedure is performed using the following equation:

$$Final\ Score = \frac{Obtained\ Score}{Maximum\ Score} \times 100$$

III. Results and Discussion

The product development process in this study followed the ADDIE model, which comprises five stages: Analysis, Design, Development, Implementation, and Evaluation. Furthermore, this study discusses students' Islamic knowledge after using the developed module as part of the evaluation of integrating Islamic values into the product.

A. Analysis

During the analysis stage, performance analysis and needs analysis were conducted. Performance analysis was carried out through discussions between the researcher and the mathematics teacher. The discussion results indicated that classroom mathematics instruction still relies primarily on textbooks. The available textbooks have limitations in terms of appearance and varied presentation of materials, thus not fully capable of attracting students' active learning interest. This condition indicates a need for more engaging instructional materials to increase students' interest in and understanding of mathematical concepts.

In addition, the school has various routine and specific activities, such as religious activities, character-building, and other school programs, which, under certain conditions, reduce classroom learning time. This limited face-to-face time means that the delivery of material and execution of exercises cannot always be carried out optimally. Therefore, students require instructional materials that support independent learning so they can continue to understand the material despite limited classroom time.

The integration of Islamic values has also not been consistently visible in learning. The teacher also conveyed that the textbooks used do not clearly convey Islamic values, and that, in the learning process, they are not always linked to them. As a result, the Islamic character that should be the school's hallmark has not strongly appeared in classroom learning activities. This condition points to a gap between the goals of Islamic education and the learning that is taking place.

The discussion results also showed that students still have trouble in learning the topic of relations and functions. Students still face challenges in drawing arrow diagrams correctly, distinguishing relations and functions in various forms of presentation, formulating function rules correctly, and reading and distinguishing linear and nonlinear function graphs. This indicates that students' mathematical communication skills still need improvement.

Based on these performance analysis results, it can be concluded that instructional materials are needed that are attractively presented, support independent learning, integrate Islamic values, and facilitate the development of mathematical communication skills. Therefore, researchers developed an Islamic-integrated mathematics module, based on mathematical communication skills, on the topic of relations and functions for SMP/MTs students.

Subsequently, a needs analysis was conducted to identify the scope and demands of the learning materials as a basis for module development. Referring to the Merdeka Curriculum (Independent Curriculum), for eighth-grade SMP/MTs mathematics (Phase D), the expected learning outcome is that students can understand relations and functions, including domain, codomain, and range, and represent them in various forms such as arrow diagrams, tables, sets of ordered pairs, and graphs. Students are also expected to be capable of graphically distinguishing linear from nonlinear functions (Badan Standar Kurikulum dan Asesmen Pendidikan, 2025).

Aligned with this outcome, learning objectives were formulated so that students can identify the concepts of sets and relations; determine domain, codomain, and range; understand the concepts and characteristics of functions as well as one-to-one correspondence; recognize function notations and formulas; calculate function values; formulate function forms; and draw and distinguish linear and nonlinear function graphs. In addition to being oriented toward academic achievement, mathematics learning also aims to strengthen the dimensions of the Pancasila Student Profile, namely belief in and devotion to God Almighty, global diversity, cooperation, independence, critical reasoning, and creativity.

B. Design

During the design stage, the mathematics module was developed as an Islamic-integrated module focused on mathematical communication skills, with predetermined module components. The design process began with preparing the front and back covers that represent the module's characteristics through institutional identity, material title and topic, mathematical illustrations, and the use of colors and geometric patterns with Islamic nuances. The front and back cover design is presented in Figure 1.

Fig. 1. Front and back cover design

Furthermore, the module is equipped with an introductory section that includes the module's identity and the developer's identity, a foreword detailing the background and expectations for the module's use, and a systematically arranged table of contents to facilitate user navigation. The module also contains a development description that explains the overall direction and characteristics of the module, including the integration of aqidah, sharia, and akhlaq values, indicators of mathematical communication skills, and their distribution across each learning activity. The table of contents and module description design are presented in Figure 2.

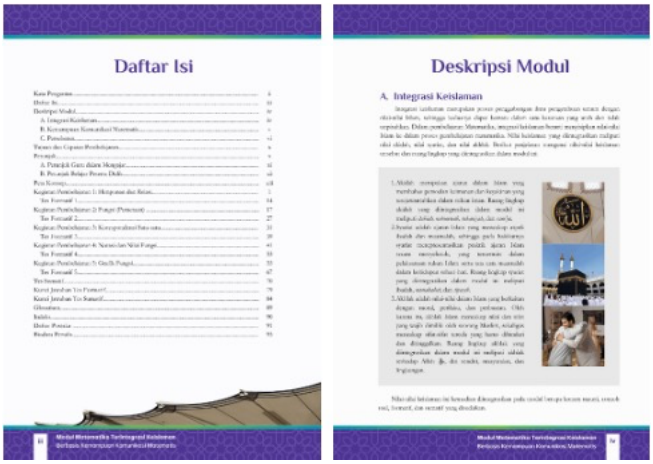

Fig. 2. Table of contents and module description design

Additionally, the module includes learning objectives and learning outcomes tailored to the Merdeka Curriculum for eighth-grade SMP/MTs (Phase D) and the Pancasila Student Profile. To support optimal implementation of the module, user guidelines for teachers and students are provided, systematically arranged from the opening stage to the lesson's close. The module is also supplemented with a concept map illustrating the hierarchical structure of the interconnections among concepts in the topic of relations and functions. The learning objectives, outcomes, and instructional design within the module are presented in Figure 3.

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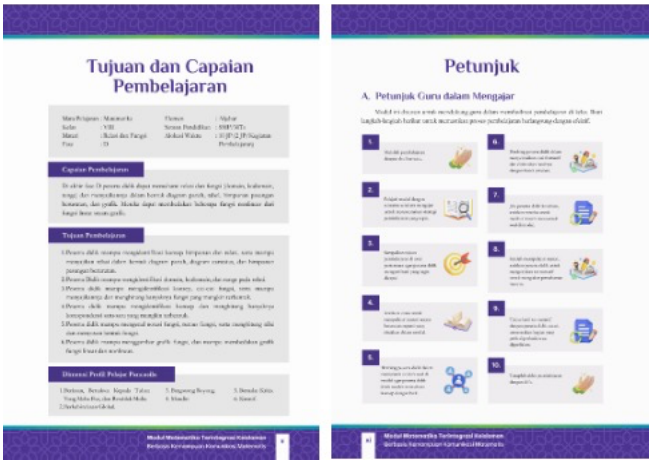

Fig. 3. Learning objectives, outcomes, and instructional design within the module

The core part of the module consists of five progressively structured learning activities: sets and relations, functions (mapping), one-to-one correspondence, function values, and linear and nonlinear function graphs. Each learning activity includes clear learning objectives and materials designed to develop students' mathematical communication skills. The learning activity design is presented in Figure 4.

Fig. 4. Learning activity design

As an evaluation component, the module provides a formative test for each learning activity and a summative test at the end of the module, accompanied by answer keys. Moreover, the module includes a glossary, index, bibliography, and the author's biography at the end. The formative test and answer key design are presented in Figure 5.

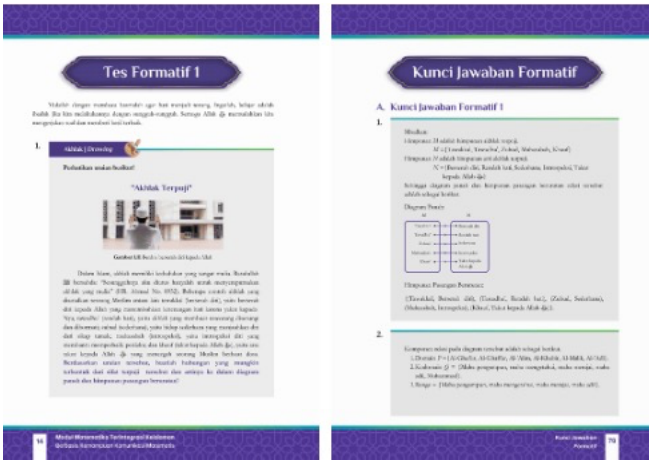

Fig. 5. Formative test and answer key design

C. *Development*

At the development stage, the module's initial product was validated by instructional materials, Islamic studies, and educational technology experts to assess its feasibility and gather feedback for improvements before implementation. The validators consisted of three individuals: two lecturers from the Mathematics Education Study Program and one mathematics teacher.

Based on validation results from instructional material experts, the validators provided several suggestions for improvement regarding the material substance and the module's mathematical presentation. The validators noted that the direction of the arrows in the diagrams needed clarification because the initial visualization was deemed insufficiently distinct, potentially leading to ambiguity in indicating the relation's direction. Furthermore, it was suggested that the shapes of the arrow diagrams be varied to help students understand that their representation is not limited to a single form.

The validators also highlighted inconsistent use of equation formatting for variables and mathematical operations, inaccuracies in some mathematical terms, inappropriate use of bold and italic lettering in accordance with mathematical writing conventions, and errors in several formative and summative test answer keys. Following up on this feedback, the researchers made revisions by clarifying the arrowhead design, varying the shapes of the arrow diagrams in examples and exercises, standardizing equation formatting, correcting mathematical terminology, adjusting mathematical typography, and revising all evaluation answer keys. An example of the revision outcome is shown in the improved arrowhead design on the arrow diagrams. A comparison of the display before and after this revision is presented in Figure 6.

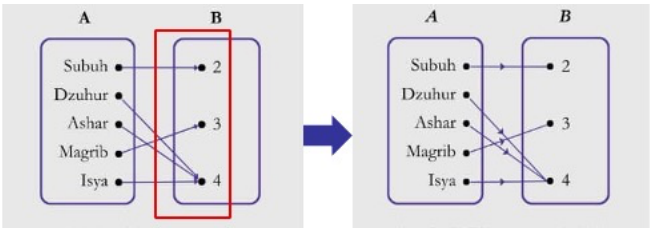

Fig. 6. Comparison of the display before and after the arrowhead design revision on arrow diagrams

Based on validation results from Islamic studies experts, the validators provided feedback on the completeness and clarity of the reference sources for the Islamic material integrated into the module. The validators found that some of the quoted hadiths lacked complete source information, listing only the narrator's name without the hadith number. Additionally, several prayers (du'a) in the module lacked clear references. This condition was deemed capable of reducing the academic and religious validity of the integrated Islamic material.

As a follow-up, the researchers completed all hadith sources with detailed hadith numbers and added reference sources to the prayers used in the module. This revision was carried out to ensure that the integration of Islamic values in the module possessed a clear, credible, and accountable foundational reference. The addition of the hadith numbers demonstrates the revision outcome. A comparison of the display before and after this revision is presented in Figure 7.

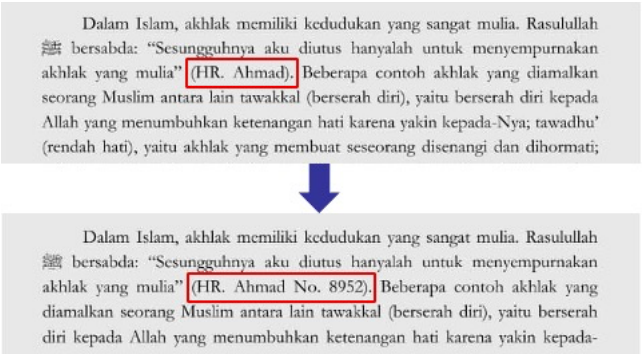

Fig. 7. Comparison of the display before and after the addition of the hadith number

Meanwhile, based on validation results from educational technology experts, the validators offered suggestions for improving the module's design, layout, and systematic presentation. The validators recommended that the table of contents be structured more comprehensively and aligned with the module's content structure. Furthermore, the icons and narrative of the Islamic integration needed to be visually separated from the mathematical communication skill test questions so that students could more easily distinguish between supporting information and core questions. The validators also highlighted structural inconsistencies in several subheadings, capitalization errors in headings and subheadings, and the inclusion of image sources on every illustration, which was deemed less effective since all images originated from the same source.

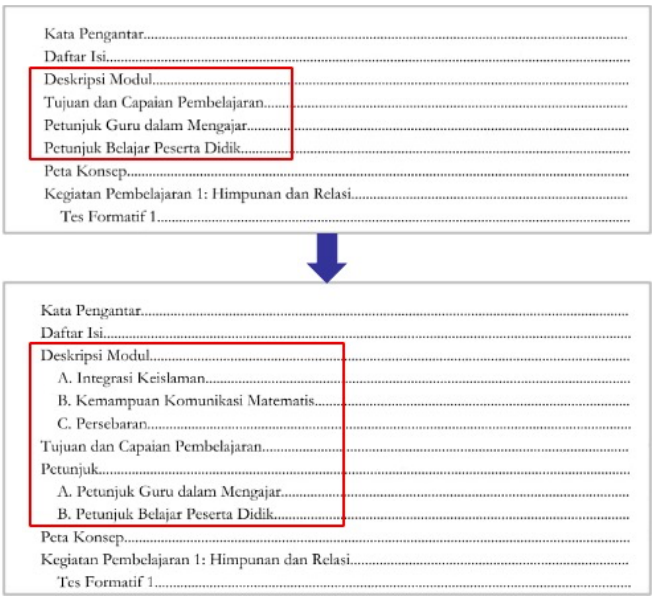

Fig. 8. Comparison of the display before and after the table of contents revision

Following up on this feedback, the researchers revised the table of contents, added visual distinctions to the test questions through text color, corrected the structure and formatting of subheadings, adjusted capitalization according to writing rules, and relocated image sources to the bibliography. These revisions were implemented to enhance the module's overall display quality, design consistency, and readability. An example of the revision outcome is shown in the improved table of contents. A comparison of the display before and after this revision is presented in Figure 8.

D. Implementation

At the implementation stage, the mathematics module declared valid by the validators was tested to assess its practicality and effectiveness. Practicality testing was conducted through a small-group trial and a limited-group trial. At the same time, effectiveness data were collected via a post-test administered at the end of learning during the limited-group trial.

The small-group practicality trial involved 40 ninth-grade students from SMPIT Az-Zuhra Islamic School Pusat, whom the mathematics teacher randomly selected. This trial aimed to assess the module's initial practicality and identify deficiencies before it was implemented on a broader scale. Based on the practicality questionnaire analysis, the module achieved a 93.87% score, placing it in the highly practical category. These results indicate that the module is easy to use, systematic, and well-understood by students during the initial trial phase

Next, the limited-group practicality trial was conducted with 52 eighth-grade students at SMPIT Az-Zuhra Islamic

School Pusat, using direct module implementation in the learning process. After the learning was completed, students filled out the practicality questionnaire and took the posttest. The questionnaire analysis results showed a practicality percentage of 82.32%, indicating a high level of practicality. This finding indicates that the module maintained a high level of practicality when implemented in real learning within a larger group.

To evaluate the effectiveness of the developed module, a mathematical communication skills posttest was administered to students in the limited group after all learning activities using the module were concluded. The posttest instrument consisted of three essay questions, each previously validated by three validators. The recapitulation of the descriptive statistics of the posttest results is presented in Table 3.

Table 3. Descriptive Statistics of Posttest Results

n	$\bar{x}$	$Median$	Sd	X_{min}	X_{max}
52	79,01	83.33	19.63	16,67	100

The posttest data were then analyzed to assess the effectiveness of the module. Based on the results of the normality test using the Kolmogorov-Smirnov test, a significance value of 0.001 ($p < 0.05$) was obtained, indicating that the data were not normally distributed. Therefore, a hypothesis test was conducted using the non-parametric One-Sample Wilcoxon Signed Rank Test to determine whether the median of the students' learning outcomes had reached the learning objective achievement criteria set by the school, namely 78. The results of the Wilcoxon test showed a standardized test statistic of 1.243 with an asymptotic significance probability (Asymp. Sig. 2-tailed) of 0.214. Since the significance value of 0.214 is greater than the significance level $\alpha = 0.05$, the null hypothesis is accepted.

This statistically proves that there is no significant difference between the students' posttest scores and the mastery target of 78. In other words, the students' mathematical communication skills have met the established learning objective achievement criteria, thereby proving that the developed module is effective for use in mathematics instruction.

E. Evaluation

During the evaluation stage, the researchers revised the developed module based on suggestions and feedback from validators and students. Evaluations were carried out during the development and implementation phases to ensure the module met valid, practical, and effective criteria before broader use. At the development stage, evaluation was conducted through validation by instructional material, Islamic studies, and educational technology experts. The validation results from the instructional material experts are presented in Table 4.

Table 4. Validation Analysis Results from Instructional Material Experts

Aspect	V	Category
Content Appropriateness	0.83	Highly Valid
Presentation Appropriateness	0.82	Highly Valid
Language Appropriateness	0.81	Highly Valid
Mathematical Communication Skills	0.86	Highly Valid
Total	3.32	
Average	0.83	Highly Valid

The analysis results indicate that the module achieved an average Aiken index of 0.83, placing it in the "highly valid" category. All evaluation aspects were classified as "highly valid," namely content appropriateness (0.83), presentation appropriateness (0.82), language appropriateness (0.81), and mathematical communication skills (0.86). These findings indicate that the module material has been systematically organized, clearly presented, and aligned with the learning objectives. The gradual presentation of material, progressing from simple to more complex concepts, helps students understand it more systematically. Additionally, the module's activities are designed to encourage students to write down mathematical ideas, use symbols, and explain their answers in their own words.

This aligns with the views of Putri and Rahmawati, as cited by Lajiba (2021) valid instructional materials must contain accurate concepts, be systematically organized, and align with the skills intended for development. This finding is also supported by Sagala (2023), who states that sequentially organized, validated mathematics teaching materials can improve students' mathematical communication skills. Furthermore, the validation results from the Islamic studies experts are presented in Table 5.

Table 5. Validation Analysis Results from Islamic Studies Experts

Aspect	Statement No.	V	Category
Aqidah	1, 2, 3	0.92	Highly Valid
Sharia	4, 5, 6	0.92	Highly Valid
Ethics	7, 8, 9, 10	0.85	Highly Valid
Total		2.69	
Average		0.90	Highly Valid

Based on the analysis, the module achieved an average Aiken index of 0.90, placing it in the "highly valid" category. The aspects of Aqidah and Sharia each scored 0.92, while the aspect of ethics scored 0.85, all of which fall within the "highly valid" category. These results indicate that Islamic values have been integrated appropriately and relevantly into the learning materials. The integration of Islamic values is not presented as an add-on but is directly linked to the material being studied, enabling students to understand these values through learning activities.

This finding aligns with research by Wahyuni et al. (2025), who stated that instructional materials are considered effective when Islamic values are conveyed through content and learning activities aligned with the learning objectives. Furthermore, Fiandini et al. (2024) explain that integrating religious values into lesson materials can help students understand moral values and foster religious attitudes in their daily lives. Next, the validation results from the educational technology experts are presented in Table 6.

Table 6. Validation Analysis Results from Educational Technology Experts

Aspect	Component	V	Category
Feasibility	Module Size	0.79	Valid
Graphics	Module Cover Design	0.83	Highly Valid
	Module Content Design	0.81	Highly Valid
Total		2.43	
Average		0.81	Highly Valid

The results of the educational technology expert validation are presented in Table 6. The module achieved an average Aiken index of 0.81, categorized as highly valid. In terms of graphic design, the module size component received a score of 0.79, classified as valid. In contrast, the module cover design and module content design received scores of 0.83 and 0.81, respectively, indicating high validity. These results indicate that the module features an attractive visual appearance, a structured layout, and a design that supports the readability of the material. A well-designed module can enhance learners' comfort during the learning process, particularly in self-directed learning.

This finding is supported by research by Utami et al. (2025), which states that good instructional material design can help learners understand the material more effectively. Santoso et al. (2025) also emphasize that a neat layout, appropriate color selection, and clear presentation of material can enhance students' focus during learning.

Next, the evaluation proceeded to the implementation stage to assess the module's practicality and effectiveness. The practicality of the module was first examined through a small-group trial involving a limited number of students. The results of the small-group practicality test are presented in Table 7.

Table 7. Results of the Small-Group Practicality Analysis

Aspect	Percentage	Category
Completeness of Learning Materials	93.94	Very Practical
Presentation of Activities and Exercises	93.00	Very Practical
Language Use	93.40	Very Practical
Relevance of Example and Practice Problems to Mathematical Communication Skill Indicators	92.83	Very Practical
Integration of Islamic Values	96.33	Very Practical
Total	469.51	
Average Percentage	93.87	Very Practical

After revisions based on the small-group trial, the module was further evaluated through a limited-group trial to obtain broader feedback regarding its practicality in the learning process. The results of the limited-group practicality test are presented in Table 8.

Table 8. Results of the Limited-Group Practicality Analysis

Aspect	Percentage	Category
Completeness of Learning Materials	82.76	Very Practical
Presentation of Activities and Exercises	81.35	Very Practical
Language Use	82.24	Very Practical
Relevance of Example and Practice Problems to Mathematical Communication Skill Indicators	81.13	Very Practical
Integration of Islamic Values	84.13	Very Practical
Total	411.61	
Average Percentage	82.31	Very Practical

The practicality test results showed an average percentage of 93.87% for the small-group trial and 82.31% for the limited-group trial. Both results fall within the highly practical category. The percentage decrease from the small-group trial to the limited-group trial is expected, given differences in student characteristics and learning conditions.

Despite the decrease, the value remaining above 80% indicates that this module demonstrates good adaptability to various student conditions. This aligns with the findings of Nurhamdiah et al., (2020) which states that practical instructional materials remain effective for use across various learning situations.

The systematic arrangement of materials and activities influences this high level of practicality. Students are guided by simple to more complex concepts, making the material on relations and functions easier to understand. Furthermore, clear instructions help students convert word problems into representations such as diagrams, tables, and graphs without confusion. Additionally, the module's practicality is evident in its support for students' mathematical communication. Clear instructions for solving problems help students transition seamlessly from understanding word problems to representations such as arrow diagrams, tables, and graphs.

Interestingly, the questionnaire results showed that the Islamic material aspect was the most practical and the most favored section among the students. This explains why the module feels easy to use and engaging. Integrating Islamic values, such as linking the concepts of relations to *silaturahmi* (maintaining kinship ties) and *muamalah*

(social interactions), brings abstract material closer to students' daily lives, thereby fostering interest in learning and making them feel more comfortable understanding it. This is in line with the research by Yusnita et al., (2016) and (Kurniati, 2018) who state that integrating religious values can elevate students' interest and the meaningfulness of learning.

On the other hand, the language use aspect indeed received a lower score than the other aspects, though it remained in the highly practical category. This is understandable as students must simultaneously comprehend several language types: mathematical language, word problem language, and religious terminology. Nevertheless, this result indicates that the language used in the module remains suitable for the students' level of understanding.

Overall, these practicality test results show that the developed module is not only theoretically valid but also easy to use in pedagogical practice. This module effectively helps students understand concepts, increases active participation, and encourages independent learning.

The effectiveness test was conducted to determine the effectiveness of the module in improving students' mathematical communication skills. Based on the descriptive analysis, the mean posttest score was 79.01, which exceeded the school's learning achievement criterion of 78. Furthermore, the results of the One-Sample Wilcoxon Signed-Rank Test indicated that this achievement significantly met the predetermined criterion. These findings suggest that the module functions not only as a learning resource but also as an effective instructional tool that helps students develop more structured and systematic ways of thinking. The module's effectiveness can be attributed to the gradual organization of the learning materials and assessment tasks, which progress from simple to more complex concepts, enabling students to follow the learning process more comfortably and effectively.

This is in line with the findings of Rahmawati et al., (2019) who assert that instructional materials will be more effective if learning activities are structured around the intended objectives. Moreover, Ikhsan et al., (2025) explain that learning demanding students to actively solve problems and discover their own answers can improve concept comprehension more deeply compared to learning that solely focuses on rote memorization.

Upon deeper analysis, mathematical communication skills indicate that the indicator "modeling situations into pictures, graphs, or algebraic expressions" achieved the highest posttest score, reaching 172. This high score indicates that although the number of distributions was not the highest, students understood it well because of the indicator's visual nature. This helps students transform the abstract concepts of relations and functions into more concrete representations. This finding aligns with Bruner's cognitive theory, which posits that understanding deepens when students are accustomed to translating a concept into various forms of representation, ranging from concrete to visual to symbolic (Hatip & Setiawan, 2021).

The indicator "expressing real objects, situations, and daily events into mathematical models and solving them" obtained a posttest score of 160. The high number of distributions for this indicator provides students with the opportunity to practice modeling contextual problems repeatedly. This shows that the more often students engage in an activity (time on task), the better their mastery will be. In addition, integrating Islamic values into the module that are close to students' lives also helps make the comprehension process more meaningful. This aligns with Kurniati, (2018) research stating that the use of contexts closely related to students' lives helps the concept comprehension process become faster and more meaningful, supported by Nurhamdiah et al., (2020) who state that integrating Islamic values can increase the relevance of meaning and learning interest.

Meanwhile, the indicator "restating a mathematical description in one's own words" received a score of 160 with 7 distributions. This score is lower than the other indicators. This can be understood because explaining back requires both thinking and language skills simultaneously, making it more challenging for students. This explanation aligns with Sweller's cognitive load theory, which states that tasks involving multiple cognitive processes simultaneously will increase the cognitive load on students (Puspa et al., 2020).

Overall, the developed module is effective in enhancing students' mathematical communication skills. Each indicator achieved good results, with score variations influenced not only by the number of distributions but also by the indicators' characteristics and the form of material presentation. Therefore, the module's effectiveness is not solely determined by the quantity of exercises, but also by the suitability of the activities to the indicators, the appropriate use of representations, and the relevance of the context to students' experiences.

Subsequently, to determine students' Islamic knowledge after using the Islamic-integrated mathematics module, the researcher administered an Islamic knowledge questionnaire to a limited group of 51 students. The questionnaire was administered after the entire learning process using the module was completed, to assess the extent to which the module improved students' Islamic knowledge. The analysis results are presented in Table 9.

Table 9. Islamic Knowledge Analysis Results

Aspect	Percentage	Category
Content	81.83	Very Good
Example Problems	80.13	Very Good

Practice Problems	79.35	Good
Illustrations	79.74	Good
Total	321.05	
Average	80.26	Very Good

The analysis results show that students' Islamic knowledge averaged 80.26%, placing it in the "very good" category. This achievement demonstrates that the Islamic values integrated into the module are not merely present as supplements but are genuinely understood by students as part of their learning process.

If examined more closely, this high level of Islamic knowledge is influenced by how the module presents the integration of these values across various learning components. In the example problems, for instance, the highest percentage was 90%. This indicates that students find it easier to grasp Islamic values when presented in concrete situations closely related to their lives. Example problems that link mathematical concepts to *muamalah* practices or daily life contexts help students focus not only on the mathematical solution but also on the meaning of the embedded values. This finding is in line with the research by Ekawati et al., (2019) which explains that presenting example problems grounded in an Islamic context can help students understand religious values more concretely and practically.

Additionally, the material content and illustration aspects contributed strongly to the formation of students' Islamic knowledge, achieving 88% and 84%, respectively. Material explanations that link mathematical concepts with Islamic values, when supported by relevant illustrations, aid students in understanding the connection between abstract concepts and real life. The illustrations not only clarify the material but also reinforce the intended value message. This is in accordance with the findings of Hikmah & Haqiqi, (2021) who state that a combination of material explanation and appropriate visualization can help students comprehend concepts along with their underlying values much more easily.

In the practice exercises, the 86% achievement indicates that students' active involvement in solving problems helps solidify their understanding of Islamic values. When students practice solving problems with an Islamic context, the process not only hones their thinking skills but also enriches their understanding of values related to daily life.

Overall, the four integration aspects: material content, example problems, illustrations, and practice exercises, mutually complement each other in shaping students' Islamic knowledge. This process demonstrates that Islamic values in mathematics learning can be harmoniously integrated without disrupting conceptual understanding. These results parallel the research by Usmadi et al., (2022), which found that learning that integrates Islamic values can shape a more comprehensive understanding, encompassing not only the academic aspect but also values and attitudes.

The researcher acknowledges that this development study has several limitations. First, the effectiveness test employed a one-shot case study design without a control group; therefore, the findings do not allow for a comparison of the module's effectiveness with other instructional materials or teaching methods. Second, the study involved students from only one school, namely SMPIT Az-Zuhra Islamic School Pusat. Consequently, the results cannot be generalized broadly and may differ when applied to schools with different student characteristics and learning environments. Third, the developed module was limited to the topic of relations and functions. Therefore, the integration of Islamic values and mathematical communication skills into other mathematics topics requires further investigation in future studies

IV. Conclusion

Based on the research findings, the Islamic-integrated mathematics module, focusing on mathematical communication skills for the topic of relations and functions, meets the criteria of validity, practicality, and effectiveness. The module was declared valid based on evaluations by instructional material, Islamic studies, and educational technology experts, demonstrating that it satisfied the feasibility criteria for content, presentation, language, graphics, and the integration of Islamic values and mathematical communication skills. From a practicality perspective, the module received a highly practical rating in both the small-group and limited-group trials, indicating that it is easy to use, easy to understand, and systematically presents learning activities. From an effectiveness perspective, the module helped students achieve the Learning Objective Achievement Criteria (KKTP), as indicated by posttest results on mathematical communication skills. Furthermore, questionnaire results showed that students' Islamic knowledge after using the module fell into the "very good" category. Thus, the developed module is suitable for use as a mathematics instructional material because it not only supports the understanding of mathematical concepts but also facilitates the inculcation of Islamic values in learning. Based on the research findings, it is suggested that future studies develop similar modules covering a broader range of materials and implement them across different educational levels to test the product's applicability more. In addition, module development can be combined with interactive educational technologies, such as digital media, project-based activities, or interactive exercises, to elevate student engagement in learning and to more meaningfully fortify understanding of mathematical concepts and the internalization of Islamic values.

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