Integrating Realistic Mathematics Education With Islamic Values: A Statistics Module for Grade X Students

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Abstract

The urgency of this research arises from the absence of a statistics module based on the RME approach that integrates Islamic values, designed to help students understand mathematics contextually while instilling character values. This research is development research using the ADDIE (Analysis, Design, Development, Implementation and Evaluation) model which aims to produce a high school statistical module based on the RME approach integrated with Islamic values that meets valid and practical criteria. The subjects of this research were class X of SMAN 4 Semarang's students. The data collection technique used was a validation and practicality questionnaire. The validity instrument consists of a validation sheet for material expert, media, Islamic and practitioner modules, as well as a practical instrument, namely a student response questionnaire. Based on the results of validity and practicality tests, the statistical module based on the RME approach integrated with Islamic values that has been developed is valid and practical.

Keywords: module; RME; Islamic Values; Statistics

Introduction

Teachers and students frequently encounter obstacles during the learning process when studying mathematics, which is an abstract and deductive science (Ramdani, in Sohilait, 2021). The efficacy and efficiency of the learning process can be impacted by the mathematics' abstract nature, which often renders it less engaging. In the context of high school education, statistics is one subject that poses unique challenges, as it requires students to comprehend, analyse, and make data-driven decisions while navigating abstract concepts. A needs survey conducted in January 2024 involving 34 students in class X-7 at SMAN 9 Semarang revealed that 84.45% of students expressed a high need for module development. This survey's results also highlighted that 61% of respondents concurred with the importance of creating modules that incorporate Islamic values and address contextual issues in the students' environment. Furthermore, an interview with a mathematics teacher at the same school highlighted that the utilisation of mathematics modules remains severely restricted. The modules currently in use fail to meet standards for quality and engagement, as they lack contextual content, summaries of the material, and illustrations to support clarity. From the perspective of character education, these modules also do not integrate Islamic values or

other character-building elements relevant to the students' environment. This situation underscores the urgent need for innovative teaching materials tailored to the characteristics of the learners.

Using high-quality teaching materials is a critical component of improving the learning experience (Sungkono, 2003). According to Meyer (1978), the module is a type of printed teaching material that is composed of material that is organised in a concise and specific manner to guide students through a series of structured learning activities. According to Prastowo (2015), one of the functions of a module is to encourage students to learn independently, thereby decreasing their dependence on instructors. In the context of statistics learning, a well designed module can help students understand complex concepts more effectively and foster self-directed learning. In this context, it becomes imperative to create instructional materials in the form of modules that connect mathematics to Islamic values and real-world experiences consistent with students' characteristics. This approach aims to achieve a harmonious balance between scientific knowledge and religious and moral education. Incorporating Islamic values into the module can also provide students with a deeper understanding of how mathematics relates to their faith and daily lives, enhancing both academic and character development.

Realistic Mathematics Education (RME) is an instructional approach that emphasizes the connection between mathematics and real-world contexts. It is grounded in the belief that mathematics is a human activity and should be taught in a way that relates to students' immediate reality and experiences (Yilmaz, 2020). Various studies have validated the effectiveness of RME in improving students' mathematical understanding and problem-solving skills. For instance, students using RME-based materials showed significant improvement in their ability to solve real-world problems and communicate mathematical ideas as stated in Zuliyanti and Rizkianto (2022). This approach has been employed to develop a module on plane-sided space shapes for Grade VIII students at SMP N 3 Sawit Boyolali (Achmad Ari Safi'i, 2019), a science learning module on the reproductive system for Grade IX students at Madrasah Tsanawiyah (Faiz Hamzah), and a mathematics module that is integrated with Islamic values in Riau Province (Suci Yuniati, Arnida Sari, 2017). The distinction in this investigation is the creation of a high school statistics module that is integrated with Islamic values and is founded on the Realistic Mathematics Education (RME) approach. If the module attains a minimum percentage of 70%, it is deemed valid and practical.

Method

The research undertaken is development research, or Research and Development (R&D), utilising the ADDIE development methodology (Analysis, Design, Development, Implementation, and Evaluation) (Sugiyono, 2016). The methodologies and tools employed to evaluate the feasibility of the developed module encompass interview instruments, validation sheets featuring four validators—material experts, media experts, Islamic experts, and practitioners—as well as questionnaires comprising a needs assessment questionnaire and a practicality questionnaire. Qualitative data comprises descriptions derived from corrections made during the validation phase, whereas quantitative analysis is utilised to derive validity scores. Table 1 gives the data collection techniques.

Table 1. Data Collection Techniques

Instruments	Data Source	Collection Period
Needs assessment questionnaire	Students	Prior to the preparation of the module
Validation quetionnaire	Validators	After Completion of the Initial Product
Student Response Questionnaire	Students	After Validation

A questionnaire was employed to evaluate the product's validity in this research. The validation questionnaire was completed by validators, who were mathematics instructors (at SMAN 9 Semarang) and expert lecturers (from UIN Walisongo Semarang). The indicators assessed in this questionnaire include the presentation aspects of the module, Islamic values, language, content feasibility, and Realistic Mathematics Education (RME) content. This questionnaire employed a scoring scale ranging from 1 to 5. The Percentage Value (PV) formula was employed to analyse the scores provided by the validators in the following manner:

$$PV = \frac{Total\ score\ of\ respondent\ answer}{Total\ perfect\ score} \times 100\%$$

The percentage value (PV) is subsequently transformed into qualitative form according to the criteria specified in the following Table 2.

Table 2. Validity Criteria and Product Revision

Percentage (%)	Validation Criteria
$85 \leq P < 100$	Highly Valid
$70 \leq P < 85$	Valid
$55 \leq P < 70$	Moderately Valid
$40 \leq P < 55$	Less Valid
$1 \leq P < 40$	Unvalid

Source: Adapted from Akbar (2013)

The purpose of the practicality analysis is to ascertain the product's applicability. Consequently, the practicality analysis is derived from the responses of mathematics instructors and the feedback of students. A practicality questionnaire is employed to gather data, which encompasses indicators such as module presentation, module usage, Realistic Mathematics Education (RME), and Islamic values.

a. Data has been tabulated from respondents, consisting of 34 students from class X7. The evaluation of the student feedback questionnaire was carried out using a checklist (✓) for the subsequent options:

Table 3. Questionnaire Score

Criterion	Category	Score
NS	Not Suitable	1
LS	Less Suitable	2
MS	Moderately Suitable	3
S	Suitable	4
VS	Very Suitable	5

The average score was subsequently determined by averaging the responses to the questionnaire.

b. Finding the greatest score from the practicality test questionnaire using the following formula:

$$\text{Highest Score} = \text{Number of Items} \times \text{Maximum Score}$$

c. The score is determined by adding the scores of each validator.

$$\text{Validity Level} = \frac{\text{Obtained Score}}{\text{Highest Score}} \times 100\%$$

d. Interpreting the data based on Table 4.

Table 4. Practicality Criteria

Percentage (%)	Practicality Criteria
$85 \leq P < 100$	Highly Practical
$70 \leq P < 85$	Practical
$55 \leq P < 70$	Moderately Practical
$40 \leq P < 55$	Less Practical
$1 \leq P < 40$	Not Practical

Source: Adapted from Akbar (2013)

The developed module is deemed practical if the feedback from students and teachers is classified as good or very good. Consequently, the minimum requirement that must be met is 70%.

Results and Discussion

This research and development resulted in a statistics module for grade X, designed according to the Realistic Mathematics Education (RME) paradigm and filled with Islamic principles. RME is centered around the idea that mathematics should be taught in a context that is relevant to students' everyday experiences, making the learning process more meaningful and engaging. This approach aims to help students develop a deeper understanding of mathematical concepts by connecting them to real-world applications (Adi, 2022).

The product prototype was created with the ADDIE development approach, encompassing Analysis, Design, Development, Implementation, and Evaluation. The specific stages of its evolution are as follows

1. Analysis

This is the preliminary phase undertaken to assess needs and delineate development requirements (McGriff, 2000). The analytical procedures included an interview with a maths teacher at SMAN 9 Semarang. This measure was used to collect comprehensive data concerning the attributes of the students, educational activities, and learning materials. The interview data were subsequently analysed according to three dimensions: learning analysis, student analysis, and material analysis.

a. Learning Analysis

Students' academic achievement in mathematics often fails to meet the Learning Objectives Achievement Criteria (KKTP), set at 75. The main learning resources predominantly used by students are textbooks and modules supplied by the institution. Nevertheless, these textbooks and modules are deemed difficult for pupils to utilise because of their succinct explanations. Furthermore, the current literature lacks adequate insight into character values pertinent to the educational content; one such value that might be integrated is Islamic values. Imparting Islamic ideals to pupils is crucial for achieving equilibrium among scientific knowledge, religious comprehension, and ethical growth.

b. Student Analysis

The survey conducted by the researcher among students reveals a demand for a statistics module that incorporates the Realistic Mathematics Education (RME) method alongside Islamic principles. The aggregate score from 34 responders was 1,837 out of a potential

maximum of 2,175, equating to 84.45%, indicative of a significant need for a statistics module employing the RME approach combined with Islamic values.
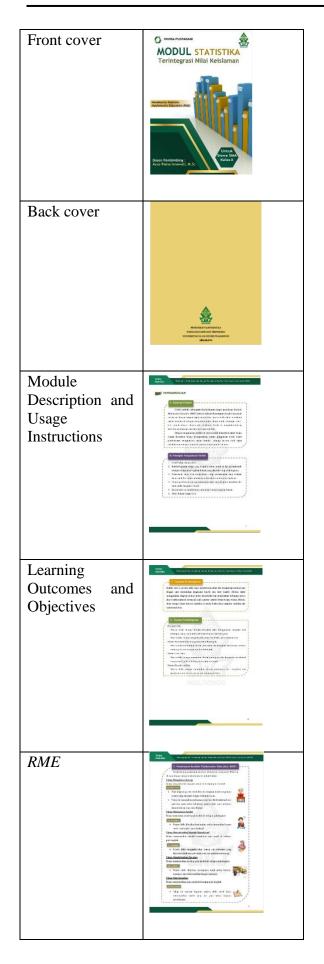
c. Material Analysis

The material analysis was performed to ascertain the extent and limitations of the content. This phase commenced with an analysis of the Learning Outcomes (CP) and Learning Objectives (TP) for grade X mathematics in the Merdeka Curriculum, with the Teaching Module used by SMAN 9 Semarang as a reference. a) The instructional materials employed are textbooks containing overly succinct explanations. b) No educational materials exist that facilitate the integration of mathematics with Islamic ideals. c) Students exhibit a considerable degree of autonomous learning. d) Statistics is a subject instructed to tenth- grade pupils during the second semester.
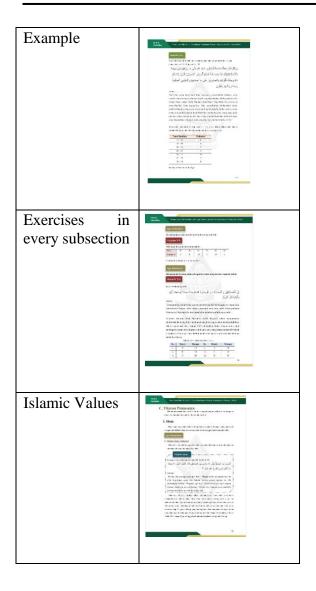
2. *Design*

This design step translates the analysis results from the initial stage. The procedure is as follows:
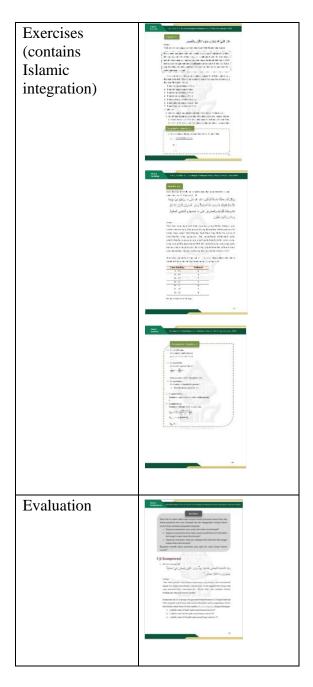
Draft Preparation

This step aims to provide a preliminary draft informed by the previously conducted needs analysis. The elements that function as references for composition are as follows: 1) The topic is provided thoroughly and in detail, accompanied by examples of solutions that enhance students' comprehension of the content. 2) Islamic material is incorporated, featuring the spiritualization of general knowledge and a column on Islamic values at beginning of each sub-chapter, accompanied with an Islamic context. 3) Incorporation of illustrative problems, practice enquiries, and concluding unit assesments to facilitate students in evaluating their competencies and comprehension. 4) Execution of the procedures of Realistic Mathematics Education (RME). 5) The module is explicitly designed for the subject of statistics. The following is the preliminary draft of the module prepared by the author:

Front cover		Concept map	
Back cover		Statistics in Islamic Perspective	
Module Description and Usage Instructions		Historical Exploration	
Learning Outcomes and Objectives		Aperception	
RME		Material and Learning Activity	

Example		Exercises (contains Islamic integration)	
Exercises in every subsection			
Islamic Values		Evaluation	

3. *Development*

    a. *Validation step*

    The initial prototype design is then presented for evaluation by experts skilled in statistics, module development, and the incorporation of Islamic principles.

    Validation is conducted using a validation instrument in the form of a scaled assessment questionnaire. Table 5 gives the result.

Table 5. Recapitulation of Validator Assessment Results

No	Aspects	Percentage	Qualifications
1	Content	100%	Very Valid
2	Media	71%	Valid
3	Islamic Values	83%	Valid
4	Practical Application	87%	Very Valid

The results in Table 5 indicate that the initial prototype module is overall valid and practical based on expert evaluation in four aspects. The content received a perfect score of 100% and was deemed "Very Valid," confirming the material's comprehensiveness and alignment with educational objectives. The media aspect scored 71%, categorized as "Valid," suggesting the design and visual elements are functional but could benefit from enhancements to improve engagement and user experience. The integration of Islamic values scored 83% ("Valid"), indicating appropriate incorporation but with potential for further refinement to strengthen its relevance and impact. Finally, the module's practical application achieved 87%, rated as "Very Valid," demonstrating its strong potential for effective use in the classroom and supporting structured independent learning. These results suggest that while the module is well-developed overall, minor improvements in media design and Islamic values integration could further enhance its quality.

    b. *Module Revision Step*

    In addition to providing quantitative assessments, the validators also offered suggestions and comments for the enhancement of the learning module, which are presented in Table 6.

Table 6. Validators' Suggestions and comments

No.	Aspect	Comments	Suggestions
1	Material	a. The layout design is already well-executed. b. The module includes comprehensive material and enrichment questions based on the RME approach.	a. Improvements are needed regarding the writing format (please standardize the font used). b. Additional references should be included. c. Please verify the accuracy of the symbol usage.
2	Media	a. The connections between questions need to be adjusted for better coherence. b. The placement/selection of verses in relation to the material is sometimes inappropriate.	
3	Islamic Values	a. There are still some inaccuracies in the Arabic script	a. For each problem, if a verse is to be included, please also provide its interpretation to ensure that the application of Islamic values is effectively conveyed to the students.
4	Practical	a. Overall, the module is good; however, there are concerns that some students may struggle to understand/apply the steps for problem-solving.	a. Before the practice questions, it is advisable to include several examples of calculations or steps, followed by a model of a fill-in-the-blank text to facilitate students inworking independently or in groups.

Table 6 presents the feedback from validators regarding the developed module. Several aspects were evaluated, including the material, media, Islamic values, and practicality. For the material, validators suggested improvements in the writing format, adding more references, and verifying the accuracy of symbol usage. Regarding the media, it was recommended to adjust the connections between questions for better coherence and to ensure the selection of verses is more appropriate to the material. In terms of Islamic values, it was advised to include interpretations of verses when they are used in problems to effectively convey Islamic values to students. Finally, for practicality, validators suggested including calculation examples before practice questions and providing a fill-in-the-blank model to assist students in working independently or in groups.

4. Implementation

A trial was conducted with students to gather data on the efficacy of the developed learning module. The module experiment was conducted over eight sessions from February to March 2024 at SMAN 9 Semarang, involving Class X 7 students. In the initial meeting, the module was presented to the students of Class X 7 at SMAN 9 Semarang. The pupils commenced their education with the aperception outlined in the curriculum, then addressing

the subject of histograms. Between the second and seventh meetings, the educational activities concentrated on measures of central tendency, measurements of position, and measures of dispersion, with each topic subdivided into two sessions. The concluding meeting involved the administration of a practicality assessment questionnaire by both the instructor and the students following the application of the statistics module grounded in the Realistic Mathematics Education (RME) approach, infused with Islamic principles. The classroom atmosphere during the implementation of the RME module given on Figure 1.

Figure 1. The Module Experiment on Class X-7 SMAN 9 Semarang

5. *Evaluation*

Evaluation is conducted in two forms: formative evaluation and summative evaluation. Formative evaluation refers to the assessment carried out during the module development process, aimed at making improvements and enhancements to the developed module. In contrast, summative evaluation is performed after the completion of the learning activities to determine the practicality of the learning module..

The analysis of module practicality

The analysis of module practicality is conducted to assess the level of practicality of the module. This analysis is based on the data collected from the completed response questionnaires filled out by both educators and students. The response questionnaire consists of 20 statements, which are developed from seven assessment aspects. The results of the practicality assessment analysis for educators can be observed in Table 7.

Table 7. The Results of the Practicality Assessment Questionnaire by Teacher

Aspects	Score	Maximum Score
Presentation of Module	10	15
Ease of Understanding the Material	22	30
Utilization of the Module	16	20
Islamic value	9	10
Realistic Mathematics Education (RME)	23	25
Total	**80**	100
Percentage	**80%**	

The total score obtained was 80, which corresponds to a percentage of 80%, placing it in the practical category. Practicality testing was also conducted with the students. Below is a summary of the students' responses to the developed module in Table 8.

Table 8. The Results of Assessment Questionnaire by Students

Practicality Indicators	Score	Maximum score	Practicality Grade	Criteria
Presentation of Module	471	510	92,35	Very Practical
Ease of Understanding the Material	884	1020	86,66	Very Practical
Utilization of the Module	500	680	73,23	Practical
Islamic value	269	340	79,11	Practical
Realistic Mathematics Education (RME)	691	850	79,28	Practical
Total	2815	3400	410,63	
Average	82,79%			Very Practical

The results in Table 8 indicates that the module evaluated by students has a very high level of practicality. Most of the categories received a "Very Practical" rating, such as "Presentation of Module" (92.35%) and "Ease of Understanding the Material" (86.66%), suggesting that students find the module well-presented and easy to understand. Meanwhile, the "Utilization of the Module" (73.23%) and "Islamic Value" (79.11%) indicators are still considered practical, though there is some room for improvement. The "Realistic Mathematics Education (RME)" indicator also shows a good score (79.28%), indicating that the application of realistic mathematics education in the module is well-received by students. Overall, the total score of 82.79% suggests that the module is very practical and effective for use in the learning process.

Conclusion and Suggestion

The development and research process resulted in the creation of a statistics module based on the Realistic Mathematics Education (RME) approach integrated with Islamic values, which meets the criteria for validity and practicality. The module was developed using the ADDIE model and is deemed suitable for use in instructional settings with minor revisions.

The author suggests the subsequent actions:

1. The development of the statistics module should be in accordance with the relevant curriculum in other mathematics materials.

2. In order to evaluate the module's efficacy, a Realistic Mathematics Education (RME) approach that is integrated with Islamic values should be implemented.

3. It is advisable to broaden the scope of the trials to encompass a variety of schools, including public institutions and those that are founded on pesantren (Islamic boarding schools).

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