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Development and Evaluation of a Qur'an-Integrated Interactive Mathematics E-Module to Enhance Learning Interest in Integers

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ABSTRACT (10 PT)

This study aims to develop and evaluate a Qur'an-integrated interactive mathematics e-module designed to enhance students' interest in learning integers at the Grade VII level. Employing a Research and Development (R&D) methodology, the module was created using the ADDIE model, which includes the stages of Analysis, Design, Development, Implementation, and Evaluation. The research was conducted with students from Class VII B at MTs Ma'arif NU Pituruh. Data collection instruments included expert validation questionnaires, teacher and student response questionnaires, and pre- and post-use learning interest surveys. The expert validation process involved evaluations by subject matter experts, media experts, and religious integration experts, resulting in an overall validity score of 90.56%, categorized as highly valid. Supporting instruments achieved an average validation score of 87.50%, also considered highly valid. Practicality tests involving teachers and students yielded an average score of 81.35%, indicating that the e-module is highly practical for use in classroom settings. The effectiveness test, based on student learning interest before and after implementation, showed a significant increase—from an average of 40.62% to 73.67%—shifting from weak to strong interest. These findings demonstrate that the integration of Qur'anic values with interactive digital learning materials not only supports conceptual understanding but also enhances motivation and spiritual development. Therefore, the developed e-module is deemed valid, practical, and effective for mathematics instruction in Islamic educational contexts and aligns well with the objectives of the *Merdeka Curriculum*.

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INTRODUCTION

The rapid advancement of technology and information has significantly impacted various sectors, including education. These developments have necessitated changes in the educational landscape, requiring adaptation to technological innovations to prevent educational practices from becoming outdated. In this context, technology serves as a tool that supports education through digital learning resources, instructional

management systems, and teaching aids (Lestari, 2018). Aligned with this transformation, the Indonesian government's *Merdeka Curriculum* emphasizes the integration of digital-based instructional media and resources in the learning process.

Mathematics, as a core subject taught from elementary to higher education, plays a crucial role in technological development, everyday problem-solving, and the advancement of other disciplines. Beyond mastering basic skills, mathematics education also fosters students' conceptual understanding. However, due to its abstract and axiomatic nature, mathematics is often perceived as a challenging subject (Abi, 2016). When teaching methods fail to engage learners effectively, students' motivation to study mathematics may decline (Yeni, 2015). Consequently, it is essential to employ innovative, relevant, and engaging teaching approaches and materials.

One such innovation is the e-module—an electronic learning medium accessible via digital devices. E-modules present instructional content in a structured format tailored to specific learning competencies and student needs (Ramadanti et al., 2012). In addition to being flexible and cost-efficient, e-modules can facilitate independent learning and enhance student engagement through interactive features (Chen et al., 2022; Sholeh et al., 2023).

A promising development in this area is the integration of Qur'anic values into mathematics e-modules. This approach not only promotes conceptual understanding but also strengthens students' spiritual and moral character. The Qur'an contains numerous verses that allude to mathematical principles, providing a meaningful foundation for contextualizing mathematics learning within students' religious and cultural experiences (Surani & Wahyuni, 2023). Integrating the Qur'an into mathematics instruction also aligns with the *Merdeka Curriculum*'s goal of fostering character education and religious values (Putri et al., 2023). Despite its potential benefits, Qur'an-integrated instructional materials remain scarce and are often limited to general religious content rather than systematic subject integration.

This study addresses that gap by developing a Qur'an-integrated interactive mathematics e-module focused on the topic of integers. The module is designed not only to improve students' understanding of mathematical concepts but also to enhance their interest in learning by connecting the subject matter with relevant Qur'anic content.

METHOD

This study employed a Research and Development (R&D) approach using the ADDIE development model, which consists of five phases: Analysis, Design, Development, Implementation, and Evaluation (Rusmayana, 2021). The research aimed to develop an interactive mathematics e-module integrated with the Qur'an to enhance students' learning interest, particularly on the topic of integers.

Participants

The participants in this study were students from Grade VII B at MTs Ma'arif NU Pituruh. The research object was the interactive Qur'an-integrated mathematics e-module designed to support student engagement and learning outcomes.

Instruments

To evaluate the feasibility of the developed module, three types of data collection instruments were employed. First, expert validation questionnaires were administered to assess the quality of the e-module from the perspectives of subject matter experts, media design experts, and religious integration experts. Second, teacher and student response questionnaires were used to gather feedback on the practicality and usability of the e-module in actual learning contexts. Third, learning interest questionnaires were distributed to students both before and after the implementation of the e-module to measure changes in their motivation and interest in learning mathematics.

The validation and response instruments employed a four-point Likert scale (Widoyoko, 2012), as outlined in Table 1.

Table 1. Scoring Criteria for the Expert Validation Questionnaire

Response Options	Score
Strongly Agree (SA)	
Agree (A)	
Disagree (D)	
Strongly Agree (SD)	

Data Analysis

The validation data were analyzed using the following formula (Haeriyah & Pujiastuti, 2022):

$$P = \frac{S}{N} X\ 100\% \quad (1)$$

Where:
P = Percentage (%)
S = Total score obtained
N = Maximum possible score

The resulting percentages were interpreted using the unified criteria summarized in Table 2, which categorizes the results for validity, practicality, and learning interest based on standard percentage thresholds.

Table 2. Interpretation Criteria for Validity

Percentage Range	Validity Criteria	Practicality Criteria	Learning Interest Criteria
0% < x ≤ 20%	Very Invalid	Very Impractical	Very Weak
21% < x ≤ 40%	Less Valid	Impractical	Weak
41% < x ≤ 60%	Fairly Valid	Fairly Practical	Moderate
61% < x ≤ 80%	Valid	Practical	Strong
81% < x ≤ 100%	Highly Valid	Highly Practical	Very Strong

Validation was conducted by two experts in each domain: subject matter, media design, and religious integration. Similarly, all questionnaire instruments were validated before use. The overall feasibility of the module was determined by assessing its validity (expert review), practicality (response feedback), and effectiveness (pre- and post-use learning interest scores).

RESULTS AND DISCUSSION

Result

This research followed the ADDIE development model, which includes the stages of Analysis, Design, Development, Implementation, and Evaluation. Each stage contributed to the systematic development and validation of a Qur'an-integrated interactive mathematics e-module for Grade VII students, focusing on the topic of integers.

Analysis Stage

In the initial stage, a needs analysis was conducted to identify problems in the field. The analysis revealed three key issues: (1) digital-based teaching materials were still underutilized, with most resources available only in printed form; (2) students' interest in mathematics learning was relatively low; and (3) instructional practices had yet to integrate mathematics content with Qur'anic values. These findings

indicated the need for an innovative instructional tool that could address both cognitive and spiritual dimensions of learning..

Design Stage

The second stage involved designing a prototype of the e-module. The design process included the selection and organization of integer materials, the integration of Qur'anic content, and the development of visual and interactive components using the Canva application. Flip PDF Corporate was employed to embed interactive quizzes and navigation menus, enhancing students' engagement. The design emphasized clarity, visual appeal, and alignment with the learning objectives set for Grade VII mathematics in the *Merdeka Curriculum*.

Development Stage

In this stage, the Qur'an-integrated interactive mathematics e-module was finalized and subjected to expert validation to assess its content quality, design, and religious integration. Three groups of experts—subject matter experts, media experts, and religious integration experts—each consisting of two validators, evaluated the module. The subject matter experts rated the module with an average score of 95.84%, indicating it was *highly valid*. The media experts provided a validity score of 90.83%, also categorized as *highly valid*. Meanwhile, the religious integration experts assigned a score of 85.00%, which likewise falls under the *highly valid* classification. Combining the scores from all expert groups, the overall validity of the module reached 90.56%, confirming that the developed e-module meets high standards of accuracy, design, and content alignment with religious values. The interface of the interactive e-module was presented in the Figure 1.

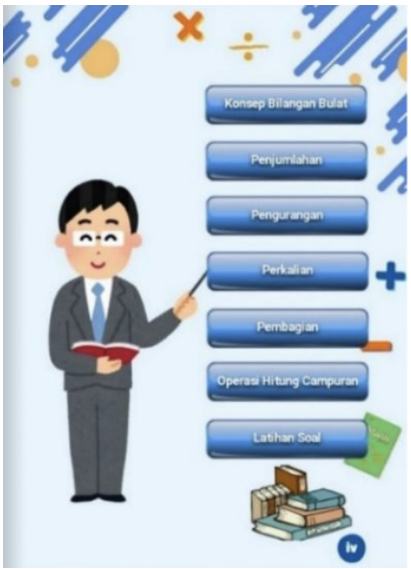

Figure 1. The interface of the e-module

In addition to module validation, the supporting questionnaires—comprising teacher response, student response, and learning interest instruments—were also validated. The teacher response questionnaire received an average score of 89.29%, while the student response questionnaire obtained 87.50%, and the learning interest questionnaire scored 85.72%. These results reflect a consistent level of *high validity* across all instruments, with an overall average of 87.50%, indicating that the questionnaires are suitable for use in evaluating the module's practicality and effectiveness.

Implementation stage

Following expert validation and necessary revisions, the e-module was implemented in both small and large group trials. In the small group trial, 10 students from Class VII A participated, while the large group involved all students from Class VII B at MTs Ma'arif NU Pituruh.

The implementation process began with the administration of a learning interest questionnaire before the use of the e-module. Students then engaged with the e-module during mathematics instruction, after which they completed a post-use learning interest questionnaire and a response questionnaire on the module itself.

Evaluation Stage

This stage marks the final phase in the ADDIE development model. Evaluation was conducted during the revision phase, followed by a comprehensive assessment of the product in terms of its validity, practicality, and effectiveness. The purpose of this stage was to determine whether the developed e-module successfully enhanced students' learning interest, based on data collected from pre- and post-use questionnaires.

The data on teacher and student responses to the e-module from both the small and large class trials are presented in Table 3.

Tabel 3. Overall Practicality Assessment from Response Questionnaires

Respondent	Percentage	Category
Small Group	76.25	Practical
Large Group	80.29	Practical
Teacher	87.50	Highly Practical
Average	**81.35**	**Highly Practical**

These results suggest that the e-module is considered practical and usable in real classroom settings by both teachers and students.

Table 4 displays the effectiveness data, specifically students' learning interest before and after using the e-module.

Tabel 4. Pre- and Post-Use Learning Interest Scores

Group	Before Use	After USe	Interpretation
Small Group	40.50	74.75	From Weak to Strong
Large Group	40.74	72.59	From Weak to Strong
Average	**40.62**	**73.67**	**Improved**

The increase in students' learning interest across both trials demonstrates the module's effectiveness in enhancing motivation in mathematics learning.

Discussions

This study aimed to develop a Qur'an-integrated interactive mathematics e-module and assess its feasibility in terms of validity, practicality, and effectiveness in enhancing students' learning interest. The development process was guided by the ADDIE model, which provides a systematic framework for instructional design. The outcomes of each stage—from needs analysis to evaluation—demonstrated that the developed e-module is not only pedagogically sound but also contextually relevant, particularly for learners in Islamic educational settings.

The needs analysis revealed that most existing teaching resources were still paper-based, and mathematics had not yet been meaningfully integrated with Qur'anic values. This aligns with Lestari (2018), who highlighted the necessity of adapting educational practices to digital advancements to remain relevant in

the era of globalization. Furthermore, studies have noted that the abstract nature of mathematics often discourages student engagement, especially when instructional strategies are not adapted to learners' needs (Abi, 2016; Yeni, 2015). The integration of interactive digital content through e-modules is a practical response to this challenge, offering a more engaging and student-centered learning experience.

The development of the e-module in this study was designed not only to address content delivery but also to incorporate religious values through Qur'anic integration. This aligns with the *Merdeka Curriculum*, which promotes the strengthening of students' spiritual and moral character alongside cognitive development. Prior research has emphasized the importance of linking instructional materials to students' cultural and religious contexts to foster deeper engagement and meaningful learning (Surani & Wahyuni, 2023; Putri et al., 2023). By incorporating Qur'anic references relevant to mathematical concepts, the e-module reinforces both academic and spiritual growth.

The validation results provided strong evidence for the quality of the developed module. All expert groups—subject matter, media, and religious integration—rated the module as highly valid, with an overall average of 90.56%. These findings are consistent with previous research by Haeriyah & Pujiastuti (2022) and Ramadanti et al. (2021), which confirmed that well-designed e-modules that integrate relevant pedagogy and interactive features can achieve high levels of content validity. Moreover, the validation of supporting instruments such as response and interest questionnaires further reinforces the reliability of the evaluation tools used in this study.

In terms of practicality, the module received positive responses from both students and teachers, with an average score of 81.35%, categorized as *highly practical*. This supports Sholeh et al. (2023), who emphasized that e-modules—especially those designed for independent and flexible learning—are effective in classroom settings and align well with modern students' learning habits. The user-friendly features designed through Canva and the interactive elements developed using Flip PDF Corporate likely contributed to this outcome. Irkhamni et al. (2021) also highlighted how Canva-based e-modules enhance engagement through visual appeal and interactivity, further validating this study's design approach.

The most significant impact of the developed module was seen in its effectiveness. Learning interest among students increased substantially after the module's implementation—rising from 40.62% to 73.67% on average. This shift, from the *weak* to *strong* category, confirms that integrating religious content with interactive digital tools can significantly enhance student motivation. Similar findings have been reported by Nuritno et al. (2017), who found that multimedia-based mathematics modules improved students' attitudes and interest in learning. The embedded quizzes with instant feedback, visually engaging design, and the religious relevance of the content likely contributed to this improvement.

Furthermore, the success of this Qur'an-integrated mathematics e-module reflects a broader trend in education that emphasizes culturally responsive pedagogy. According to Amri (2016), students are more likely to develop interest and motivation when the learning process connects to their values and lived experiences. This is particularly crucial in Islamic schools, where integrating faith with knowledge is part of the educational philosophy. Thus, the e-module does not only support academic objectives but also reinforces students' identity and spiritual understanding—outcomes that are often overlooked in conventional instructional designs.

In summary, this study contributes to the growing body of research advocating for the use of technology-enhanced learning tools that are both pedagogically effective and culturally grounded. By integrating Qur'anic content into a structured, interactive mathematics e-module, this research has shown that it is possible to achieve high levels of validity, practicality, and effectiveness. The approach supports both academic development and religious character building, providing a model for future instructional material development in similar educational contexts.

CONCLUSION

Based on the results of the development and evaluation stages, it can be concluded that the interactive Qur'an-integrated mathematics e-module on integer material for Grade VII students is feasible for use in instructional settings. The module was developed systematically using the ADDIE model, encompassing the phases of Analysis, Design, Development, Implementation, and Evaluation. The design incorporated both pedagogical strategies and religious values, using Canva for visual layout and Flip PDF Corporate to provide interactive features such as quizzes and navigable menus.

The feasibility of the e-module was supported by strong empirical evidence. Expert validation results showed that the module met the criteria for high validity, with an overall score of 90.56%. The questionnaires used to assess teacher and student responses, as well as learning interest, were also validated and scored an average of 87.50%, further confirming the module's quality. The practicality of the module was demonstrated through trials with students and teachers, yielding an average score of 81.35%, which falls into the highly practical category. In terms of effectiveness, the module significantly improved students' learning interest, with interest levels rising from 40.62% to 73.67% after implementation, shifting from a weak to a strong category.

These findings indicate that the Qur'an-integrated mathematics e-module is not only an effective instructional tool for enhancing conceptual understanding of integers but also serves to strengthen students' motivation and spiritual character. The integration of Qur'anic content adds contextual and moral relevance to the learning experience, aligning with the objectives of the *Merdeka Curriculum*. Therefore, the developed e-module is considered both pedagogically and culturally appropriate for mathematics instruction in Islamic educational settings.

Future research may expand on this development by applying similar integration models to other mathematical topics or academic subjects, thereby further promoting faith-based and student-centered learning approaches in the digital era.

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