



INTERACTIVE QUIZ-BASED FLASHCARDS FOR ISLAMIC RELIGIOUS EDUCATION: A DEVELOPMENT STUDY AT THE JUNIOR HIGH SCHOOL LEVEL

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Abstract

This study aims to develop interactive quiz-based flashcard learning media to support Islamic Religious Education (IRE) learning at the junior high school level. The research employed a Research and Development (R&D) method using the ADDIE model, which includes analysis, design, development, implementation, and evaluation stages. The field trial involved 30 junior high school students. The results of the needs analysis indicated that students require simple and engaging learning media to enhance active participation. The developed flashcard product consists of two sides (questions and answers), supported by illustrations and QR codes linked to online quizzes. Validation by material experts, media experts, and practitioners showed a "very feasible" category with an average score of 3.62 out of 4. The field trial results demonstrated that the media was easy to use, engaging, and contributed to increased student participation within the study context. The pretest-posttest results showed a significant improvement, with a gain score of 0.53, categorized as medium-high. These findings indicate that the quiz-based interactive flashcard is feasible, practical, and effective for supporting Islamic Religious Education learning at the junior high school level, particularly within the context of this study.

Keywords: Interactive Flashcard, Quiz, Learning Media, Islamic Religious Education

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Article History	Received	Revised	Accepted	Published
	2025-10-28	2026-04-02	2026-04-21	2026-06-15

INTRODUCTION

مقدمة

Learning strategies play a crucial role in determining the success of the teaching and learning process. The selection of appropriate strategies serves as a bridge between instructional materials and students' characteristics, thereby significantly influencing learning effectiveness (Afifah et al., 2025). In the context of Islamic Religious Education (ISE), learning strategies present unique challenges, as they emphasize not only the mastery of cognitive aspects but also the development of affective and psychomotor domains. The primary objective of ISE is to shape Muslim individuals who possess strong faith, noble character, and the ability to implement Islamic values in their daily lives. Therefore, instructional strategies and media are required that not only convey material verbally but also address students' attitudes, character, and spirituality in a holistic manner.

The rapid development of digital technology has significantly transformed the educational paradigm. Learning processes that were previously teacher-centered have shifted toward student-centered approaches that emphasize active engagement, meaningful learning experiences, and the integration of technology. The use of digital media such as e-learning platforms, mobile applications, interactive multimedia, and gamification is increasingly prevalent in education. Research by Hasibuan et al. (2025) shows that the integration of technology can

enhance students' accessibility, engagement, and understanding of learning materials, including religious values. However, without a holistic pedagogical approach, the use of technology may risk reducing the spiritual dimension that is central to religious education.

Furthermore, the characteristics of contemporary students as digital natives demand learning innovations that align with their learning preferences. This generation is accustomed to visual content, digital interaction, and game-based learning activities. Previous studies have demonstrated that visual media can significantly improve students' motivation and engagement (Mayasari et al., 2021). However, learning practices in ISE, particularly at the junior high school level, are still largely dominated by conventional methods such as lectures, discussions, and written assignments, with limited use of interactive media. This monotonous approach tends to make students less active, resulting in lower motivation and suboptimal learning outcomes compared to other subjects.

In response to these challenges, there is a need for learning media that not only integrates digital technology but also aligns with the holistic objectives of ISE, particularly in fostering cognitive, affective, and spiritual development. Therefore, selecting an appropriate interactive medium becomes essential to bridge the gap between students' digital learning preferences and the goals of religious education. One potential solution is the use of quiz-based interactive flashcards.

Flashcards are a form of learning media consisting of two-sided cards, where one side presents a question or stimulus and the other provides an answer or brief explanation. Initially, flashcards were widely used in language and science learning, both in print and digital forms (Aziza & Yulia, 2022). Their development has expanded into interactive digital formats that allow students to practice independently, receive immediate feedback, and repeat learning materials as needed. Quiz-based digital flashcards combine three essential functions simultaneously: visual, interactive, and evaluative.

This approach is aligned with constructivist learning theory, which emphasizes that learners actively construct knowledge through interaction, experience, and reflection. In the context of quiz-based flashcards, students engage in active recall, receive immediate feedback, and regulate their own learning pace. Furthermore, this approach is supported by Mayer's Cognitive Theory of Multimedia Learning, particularly the principles of multimedia, contiguity, and interactivity. The integration of visual elements (such as images and symbols) with concise verbal explanations helps reduce cognitive load and enhances comprehension. Immediate feedback in quiz-based formats also strengthens meaningful learning by enabling students to identify and correct misconceptions in real time (Mayer, 2020).

Various studies have demonstrated the effectiveness of flashcard media in improving learning outcomes. Rudianto et al. (2024) found that the application of flashcards in elementary school science learning increased students' average scores from 60.33 to 91.66. Similarly, Ananda et al. (2025) reported that the experimental group using flashcards achieved a higher N-Gain score (56.51) compared to the control group (40.08). Nina and Siti (2024) also found a significant improvement in mathematics learning outcomes, with student mastery increasing from 41% to 93% and average scores rising from 65 to 85. These findings confirm that flashcard media are effective in enhancing students' motivation, engagement, and learning outcomes across various subjects.

However, the application of flashcards in ISE, particularly at the junior high school level, remains limited. Most previous studies have focused on science and language learning, resulting

in limited attention to religious education contexts. In fact, ISE materials such as faith (*aqidah*), worship (*ibadah*), and morals (*akhlaq*) are highly suitable for interactive media that present concepts visually and provide evaluative practice for deeper understanding and internalization. This indicates a gap between the needs of digital-native students and conventional ISE learning practices. Moreover, teachers' limited ability to design and implement digital media further widens this gap (Faqihuddin & Muflih, 2024).

The development of learning materials is a crucial component of the teaching process, as it helps learners achieve educational goals and assists teachers in delivering content effectively. In the 21st century, learning materials should emphasize technology integration, collaboration, and creativity to foster meaningful and independent learning (Simbolon & Purba, 2023). Interactive and contextual learning principles enable students to construct their own understanding. Previous studies have shown that digital learning materials, such as Book Creator and smart flashcards, can significantly improve students' motivation, comprehension, and engagement (Kaamilah et al., 2023; Laksana & Putra, 2024).

Learning media also play an essential role as tools that transform abstract information into more concrete and understandable forms. Media facilitate communication, stimulate interest, and enhance interaction between teachers and students (Wahyuningtyas & Sulasmono, 2020). They can be categorized into visual, audio, and audio-visual forms (Agustin et al., 2025). The advancement of digital technology has led to the development of interactive media that combine images, sound, and animation, making learning experiences more dynamic and engaging (Pertiwi & Wardhani, 2023).

In the global context, recent studies highlight that technology integration in education, including religious and values-based learning, can enhance both cognitive achievement and character development when supported by appropriate pedagogical design (Redecker, 2021; Holmes & Tuomi, 2022). Furthermore, the use of gamification elements in digital learning environments has been widely recognized as effective in increasing motivation, engagement, and learning retention (Deterding et al., 2020; Subhash & Cudney, 2021).

Therefore, the development of innovative, practical, and contextually appropriate ISE learning media is essential, particularly for junior high school students. Quiz-based interactive flashcards offer a promising solution by combining visual appeal, interactivity, and evaluative features. This media is expected not only to improve cognitive learning outcomes but also to foster students' emotional and spiritual engagement, thereby contributing more effectively to the achievement of ISE learning objectives.

METHOD

منهج

This study employed a Research and Development (R&D) approach using the ADDIE model, which consists of five stages: Analysis, Design, Development, Implementation, and Evaluation. This model was selected because it is systematic, structured, and suitable for developing educational products such as technology-based learning media. Additionally, the ADDIE model enables iterative evaluation to ensure the validity, practicality, and effectiveness of the developed product (Afrianti et al., 2024).

The participants of this study were junior high school students. The implementation phase was conducted through three stages of trials: individual trials involving 3 students, small group trials involving 8 students, and field trials involving 30 students. Participants were selected using

purposive sampling based on varying academic abilities (high, medium, and low). The participants consisted of male and female students aged between 13 and 15 years who were enrolled in Islamic Religious Education classes.

The research procedure followed the five stages of the ADDIE model. In the analysis stage, a needs analysis was conducted to identify problems in the Islamic Religious Education learning process. Data were collected through interviews with teachers and classroom observations. In addition, curriculum analysis was carried out to ensure that the developed media aligned with core competencies and learning objectives. This stage is essential to address the gap between ideal and actual learning conditions (Afrianti et al., 2024).

In the design stage, the concept of quiz-based interactive flashcards was developed. This process included mapping instructional materials, designing question-and-answer content, creating visual layouts, and structuring the interactive flow of the digital media. Research instruments were also prepared, including validation sheets for experts, student response questionnaires, and pretest and posttest instruments. The design process emphasized both pedagogical and visual aspects to enhance student engagement and understanding (Peramudita et al., 2025).

In the development stage, the design was transformed into a prototype of the interactive flashcard media. The product was validated by three validators consisting of a material expert, a media expert, and an educational practitioner. The validation process used a Likert scale ranging from 1 to 5, covering aspects of content relevance, visual design, and usability. The validation score was calculated using the formula: $\text{percentage} = (\text{total score} / \text{maximum score}) \times 100\%$. The results were then categorized into validity levels. Feedback from validators was used to revise and improve the product before implementation (Akbar et al., 2024).

In the implementation stage, the validated product was tested in real classroom settings through individual, small group, and field trials. The effectiveness of the media was measured using pretest and posttest scores. The improvement in student learning outcomes was calculated using the normalized gain (N-Gain) formula: $\text{N-Gain} = (\text{posttest} - \text{pretest}) / (\text{maximum score} - \text{pretest})$. The results were interpreted using the criteria of high (≥ 0.7), moderate (0.3–0.7), and low (< 0.3). Previous studies indicate that interactive media can improve learning outcomes in Islamic Religious Education (Ramadhani et al., 2024).

In the evaluation stage, both formative and summative evaluations were conducted. Formative evaluation was carried out at each stage of development to identify and correct weaknesses, while summative evaluation was conducted after field trials to assess the overall effectiveness of the media. The effectiveness was determined based on N-Gain results and student response questionnaires.

Data were collected through interviews, observations, questionnaires, and learning outcome tests. Qualitative data were analyzed using data reduction, data display, and conclusion drawing techniques. Quantitative data were analyzed using descriptive statistics, including mean scores, percentages, and N-Gain calculations. In addition, a paired sample t-test was conducted to determine whether there was a significant difference between pretest and posttest scores.

The validity of the instruments was assessed through expert judgment involving three validators with expertise in Islamic Religious Education, instructional media, and educational practice. Reliability testing was conducted using Cronbach's Alpha, with a coefficient greater than 0.70 indicating acceptable reliability.

This study also adhered to research ethics involving human participants. Permission was obtained from the school, and informed consent was secured from students and their parents or guardians. Participants were informed about the purpose of the study, and all data were kept confidential and used solely for research purposes.

The developed product is a quiz-based interactive flashcard media accessible via digital devices. It consists of visual cards containing questions, images, and concise explanations, integrated with interactive quiz features and immediate feedback, allowing students to learn independently and repeatedly.

RESULT

نتائج

This research resulted in an interactive quiz-based flashcard media for Islamic Religious Education at the junior high school level, developed through the ADDIE model consisting of analysis, design, development, implementation, and evaluation stages. Based on expert validation, student responses, and field testing, the media was categorized as feasible, practical, and effective in improving students' understanding and engagement in Islamic Religious Education learning.

Analysis Phase: The needs analysis revealed that students require simple and engaging learning media that encourage active participation in the learning process. Students tend to experience difficulties in understanding abstract Islamic Religious Education concepts, particularly those requiring deeper reasoning. They understand more easily when the material is presented with visual or interactive media that combine text, images, and practice exercises. This aligns with the opinion (Arsyad, 2020), who stated that learning media plays a crucial role in bridging abstraction and making learning more concrete.

Interviews with Islamic Religious Education teachers showed that classroom learning is still dominated by lectures and written assignments, which often make students passive and less engaged. Teachers emphasized the need for innovative media that are simple, cost-effective, and aligned with curriculum objectives. This is consistent with (Majid, 2017), who states that learning materials must consider student needs and curriculum relevance.

Student interviews also indicated that they prefer practical and portable learning media that can be used both in class and independently. Interactive flashcards were considered engaging because they combine questions, visuals, and quizzes that promote active learning. This aligns with active learning theory (Charles C. Bonwell & James A. Eison, 1991).

Design Stage: In this stage, the flashcards were designed in a 12 × 8 cm format to ensure ease of use and portability. Each flashcard consists of two sides: one containing questions, terms, or stimulus images, and the other containing answers or brief explanations.

The visual design uses simple typography, bright colors, and relevant illustrations to support student understanding. This is important because, according to Arsyad (2020), visual media improve clarity, interest, and memory retention. In addition, QR codes were integrated to connect students to online quiz-based exercises, making the learning experience more interactive and adaptive.



Figure 1. Interactive Flashcard Media Design

Evaluation instruments such as validation sheets, questionnaires, and pretest-posttest instruments were also prepared in this stage to measure feasibility and effectiveness.

Development Stage: The development stage produced the initial version of the quiz-based interactive flashcard media. The product was validated by material experts, media experts, and Islamic Religious Education teachers.

Material validation focused on content accuracy and curriculum alignment, while media validation focused on visual design, readability, and usability. Practitioner validation emphasized classroom practicality.

The average validation score was 3.62 out of 4, which is categorized as very feasible. This shows that the media is appropriate for use in Islamic Religious Education learning. This validation process is consistent with (Dick, 2009), who emphasizes the importance of expert judgment in instructional product development.

Implementation Stage: The implementation stage involved individual, small group, and field trials. Students reported that the flashcards were easy to use, interesting, and helped them understand Islamic Religious Education materials better. The media also encouraged interaction and collaboration during learning activities.



Figure 2. Students Using Flashcard Media in Classroom Learning

These results indicate that the media improved student engagement and understanding in learning Islamic Religious Education. However, because the study did not use a control group, the results should be interpreted as improvement rather than causal proof.

Evaluation Stage: The pretest and posttest results showed an increase in average scores from 62 to 82. The N-Gain score of 0.53 indicates a moderate level of improvement. This suggests

that the quiz-based interactive flashcard media contributes positively to student learning outcomes in Islamic Religious Education.

Table 1. Validation and Trial Results of Quiz-Based Interactive Flashcard Media

Assessment Aspects	Validator	Average Score (1–4)	Category	Information
Subject Matter Expert Validation	Islamic Religious Education Curriculum Expert	3,70	Very Worthy	The content of the material is in accordance with the Basic Competencies and the context of Islamic Religious Education learning in Middle School.
Media Expert Validation	Lecturer of Educational Technology	3,55	Very Worthy	The visual design is attractive, the colours and text are easy to read, and the illustrations are relevant.
Practitioner Validation	Islamic Religious Education Teacher for Middle School	3,60	Very Worthy	The media is easy to use and suits the characteristics of the students.
Overall Average	-	3,62	Very Worthy	The media meet the criteria of content, appearance, and practicality.
Student Response	Student response questionnaire (n=30)	87,5%	Very Worthy	Students found the media interesting, practical, and helpful in understanding Islamic Religious Education material.
Learning outcomes	Pretest: 62 / Posttest: 82	0.53 (medium–high category)	Effective	There was an increase in understanding after using the media.

Based on the table above, it can be seen that the quiz-based interactive flashcard media obtained high feasibility scores from material experts, media experts, and practitioners, with an overall average of 3.62 out of 4, categorized as very feasible. In addition, student responses showed a positive perception of the media, with a response rate of 87.5%, indicating that the media was engaging and easy to use. Furthermore, the learning outcomes results showed an increase from pretest to posttest scores, with an N-Gain value of 0.53, which is categorized as moderate improvement. These findings indicate that the developed media is practical and contributes positively to students' understanding of Islamic Religious Education material.

DISCUSSION | مناقشة

The findings of this study indicate that the development of interactive quiz-based flashcards has a positive impact on improving the quality of Islamic Religious Education (PAI) learning at the junior high school level. The media was proven to be feasible, practical, and moderately effective in enhancing students' understanding, as reflected in the increase in pretest and posttest scores from 62 to 82, with an N-Gain value of 0.53. This improvement suggests that interactive learning media can facilitate more meaningful and engaging learning experiences for students (Arsyad, 2020).

The effectiveness of this media is closely related to its instructional design, which aligns with students' cognitive and learning characteristics. The analysis stage revealed that students often struggle with abstract concepts in PAI learning. Therefore, the use of visual and interactive media such as flashcards helps transform abstract religious concepts into more concrete and accessible representations (Majid, 2017). The integration of visual elements, question-based prompts, and QR-code-linked quizzes contributes to higher student engagement by combining visual stimulation, active recall, and immediate feedback.

From a cognitive perspective, the effectiveness of this media can be explained through dual coding and retrieval practice mechanisms. The combination of text, images, and interactive quizzes strengthens memory encoding by engaging both visual and verbal processing systems. In addition, repeated quiz interactions promote retrieval practice, which is known to enhance long-term retention of learning materials. The QR code feature further supports self-paced learning by allowing students to revisit materials and receive immediate feedback, which helps correct misconceptions in real time.

The QR code feature and interactive quiz component can also be understood as elements that support gamified and self-regulated learning. These features allow students to receive instant feedback, repeat learning materials independently, and engage more actively in the learning process. Such mechanisms strengthen cognitive processing and memory retention, which are essential in religious concept internalization. This is consistent with active learning theory, which emphasizes student engagement through participation, reflection, and interaction in learning activities (Bonwell & Eison, 1991).

When compared with previous studies on digital flashcards and gamified learning media in broader educational contexts, similar findings have been reported in which interactive flashcard systems significantly improve student engagement and learning outcomes, particularly when supported by immediate feedback and multimedia elements. However, many of these studies remain focused on general subjects such as language learning or science education. In contrast, this study extends the application into Islamic Religious Education, where value internalization and character formation are also central learning outcomes. This contextual shift represents a significant contribution to the field of educational technology in religious education settings.

From a pedagogical perspective, the use of flashcards also supports collaborative learning environments. The small-group trial results showed increased interaction among students during discussions and question-solving activities. This indicates that the media not only supports individual learning but also encourages social learning processes. Emotional engagement generated through quiz-based activities further strengthens motivation and conceptual understanding, making learning more meaningful (Prastowo, 2015).

In terms of practicality, teachers confirmed that the media is easy to implement without requiring complex technological infrastructure. The combination of physical flashcards and digital QR-based quizzes makes the media adaptable to different classroom conditions. This flexibility is particularly relevant in schools with varying levels of technological readiness. Such design considerations are consistent with instructional development principles that emphasize usability and accessibility in learning media (Dick & Carey, 2009).

Thus, the originality of this study lies in the development of a hybrid instructional model that integrates physical flashcards with QR-based interactive quizzes specifically designed for Islamic Religious Education at the junior high school level. Unlike previous studies that predominantly focus on either fully digital or fully printed flashcard systems, this study proposes a blended approach that bridges offline and online learning environments within the ADDIE development framework. More importantly, this model not only targets cognitive achievement but also supports affective and character-based learning outcomes, which are essential in PAI education.

However, this study has several limitations. First, the sample size and scope of implementation were limited to a specific junior high school context, which may affect

generalizability. Second, the duration of implementation was relatively short, limiting long-term impact observation. Third, the question variety and visual design of the media still require further refinement to better accommodate diverse student characteristics. Future research is recommended to expand the question bank, incorporate gamification elements more deeply, and integrate the media with broader learning management systems to enhance scalability and interactivity.

CONCLUSSION

خاتمة

This research resulted in a quiz-based interactive flashcard as an innovative learning medium for Islamic Religious Education at the junior high school level. Development was conducted using the ADDIE model, which includes needs analysis, design, development, implementation, and evaluation. Expert validation results indicate that this medium is highly suitable for use. The trial demonstrated positive responses from teachers and students, as well as significant improvements in learning outcomes (gain score 0.53, in the medium-high category). This medium has proven effective in increasing student understanding, motivation, and engagement in Islamic Religious Education learning. Therefore, quiz-based interactive flashcards can be an alternative learning medium suited to the characteristics of 21st-century learning. Further development is recommended to expand the scope of the material and integrate it with online learning platforms.

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