

Gamified Mobile Learning for Teaching the Prophet's Mandatory Traits in Elementary Education

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Abstract

The integration of digital media in Islamic elementary education remains limited, particularly in studies that integrate Islamic character education with game-based learning and provide quantitative evidence of learning effectiveness. This study develops and evaluates the usability of an Android-based educational game, *Kisah Teladan Rasul*, designed to support elementary school students' understanding of the Prophet's mandatory traits (şīdīq, amānah, tabliġh, and faţānah) through gamified mobile learning. A Research and Development approach using the ADDIE model was employed, involving 19 fourth-grade students at SDN Margorejo 2 Pati. The small sample size reflects the exploratory and developmental nature of this study, which prioritizes systematic media development over broad generalizability. Learning improvement was examined through a one-group pretest–posttest design yielding an average N-Gain score of 0.69 (medium category), indicating meaningful improvement in conceptual understanding. Usability was assessed using the System Usability Scale, with a mean score of 90.1, categorized as Excellent (Highly Acceptable). These findings suggest that an Android-based educational game integrating narrative missions, scenario-based challenges, and immediate feedback can serve as effective complementary media in Islamic elementary education. This study contributes by combining systematic instructional design (ADDIE), game-based mobile learning, and empirical usability evaluation within the specific context of Islamic character education.

Keywords: android-based learning; educational game; game-based learning; islamic character education; n-gain analysis

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INTRODUCTION

The erosion of moral values among young people has emerged as a pressing global concern in the digital era, as rapid technological transformation simultaneously creates new educational opportunities and accelerates ethical challenges among children and adolescents (Wall et al., 2026). Across diverse cultural and religious contexts, educators and policymakers increasingly recognize that character education can no longer rely on conventional transmission-based approaches, particularly as students are immersed in digital environments that reward interaction, immediacy, and engagement over passive reception (Yaman et al., 2024). The integration of digital technology into education has fundamentally reshaped how students engage with learning content, particularly through mobile and game-based applications (Wang et al., 2022). In primary education, this transformation has shifted learning



from teacher-centered toward more interactive, student-centered, and experiential environments. Within this broader transformation, character education presents a unique pedagogical challenge: students must not merely understand moral concepts cognitively but internalize and apply them in everyday life situations. This distinction between cognitive recall and genuine moral internalization is critical, as conventional Islamic education methods which predominantly rely on textbooks and lecture formats have been shown to foster surface-level memorization rather than contextual understanding (Halstead, 2004).

In Islamic elementary education specifically, students are expected to internalize the Prophet's mandatory traits *ṣidq* (truthfulness), *amānah* (trustworthiness), *tablīgh* (conveying), and *fatānah* (wisdom) not only as theological concepts but as lived behavioral norms. However, research consistently shows that students recognize these terms in isolation while struggling to relate them to real-life situations. The discrepancy between understanding and applying moral values indicates a more fundamental instructional issue, namely the limited availability of contextual and experiential learning opportunities within conventional Islamic education. Meaningful understanding is not formed through passive reception of information, but through learners' active engagement with relevant contextual problems. In line with this, experiential learning theory emphasizes that the internalization of moral values is more effectively achieved through cycles of direct experience, reflection, and application, rather than through approaches that rely primarily on memorization (Ding & Yu, 2024). Game-based learning (GBL) bridges these theoretical perspectives by embedding learning objectives within interactive, narrative-driven gameplay that activates situated cognition, intrinsic motivation, and reflective decision-making mechanisms that align directly with the demands of moral internalization (Dahalan et al., 2024; Videnovik et al., 2023). Android-based mobile learning further extends this potential through its accessibility and flexibility, enabling learning experiences both inside and outside the classroom (Pratama, 2025).

The critical examination of the existing literature reveals substantive inconsistencies and conceptual voids that limit progress in this field. Most studies on GBL in Islamic education report positive usability perceptions or general engagement, yet consistently fail to provide quantitative evidence of conceptual learning improvement, raising questions about whether observed enthusiasm reflects genuine learning or merely novelty effects (Aderibigbe et al., 2023). This methodological inconsistency is compounded by the absence of systematic instructional design in most game development studies, leaving alignment between learning objectives, content design, and evaluation stages largely unverified (Delke et al., 2025). GBL theory has been predominantly developed and validated within science, mathematics, and computational domains, where procedural skills can be measured with relative precision. The theoretical applicability to abstract moral cognition, where internalization cannot be reduced to correct answers remains conceptually underdeveloped and empirically untested. This represents a theoretical gap in the GBL literature: existing frameworks do not adequately account for the mechanisms through which interactive gameplay supports moral reasoning, situated ethical decision-making, or the transfer of abstract values into behavioral dispositions. The specific domain of Islamic moral character education, particularly the Prophet's mandatory traits, remains largely unaddressed in game-based mobile learning research, leaving this gap without empirical resolution (Chan et al., 2022).

What distinguishes this study from prior work is the systematic integration of a structured instructional approach, scenario-based game mechanics designed to facilitate contextual moral internalization, and dual empirical evaluation encompassing both usability and learning outcomes. Accordingly, this study aims to develop and rigorously evaluate an Android-based educational game to support elementary students' understanding of the Prophet's mandatory traits through gamified mobile learning, while also examining the extent to which scenario-based gameplay can foster situated moral reasoning. This study contributes

theoretically by extending the scope of game-based learning frameworks into the domain of Islamic moral education, pedagogically by demonstrating how interactive digital environments can promote deeper moral internalization beyond surface-level memorization, and empirically by providing quantitative evidence of learning improvement and usability within an underexplored educational context.

METHOD

This study employed a Research and Development (R&D) approach using the ADDIE model to develop and evaluate an Android-based educational game for improving students' understanding of the Prophet's mandatory traits, as shown in Figure 1. The ADDIE model was selected due to its systematic and iterative framework for instructional product development (Shakeel et al., 2023).

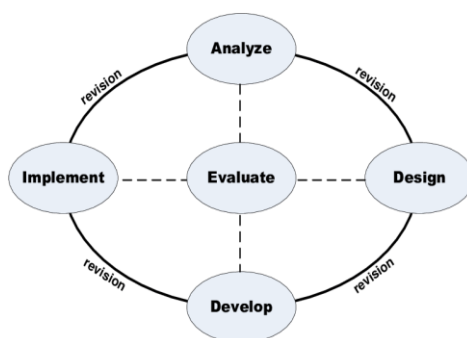


Figure 1. ADDIE instructional design model

Compared to other instructional design models such as Dick and Carey, ASSURE, or GDLC, ADDIE provides a more flexible structure for aligning pedagogical and technological components across each stage. At the Analysis stage, classroom observation and teacher interviews were conducted at SDN Margorejo 2 Pati to identify students' existing understanding and curriculum alignment.

During the design stage, the researchers developed the game concept, storyboard, learning flow, question items, character design, background visuals, navigation structure, and scoring system. The visual elements were intentionally designed to be child-friendly, using simple interfaces, bright colors, 2D animated characters to match the cognitive and emotional characteristics of elementary school students. The development stage involved producing the game using Unity with C# programming language. Functional testing was conducted using black-box testing to ensure that all features, navigation buttons, scoring systems, and transitions operated properly without system errors.

At the implementation stage, the game was used in classroom learning involving 19 fourth-grade students at SDN Margorejo 2 Pati. Fourth-grade students were selected based on curriculum alignment, as the topic is introduced at this level. The study was conducted with permission from the school, and students participated voluntarily under teacher supervision. The research used a one-group pretest by answer 20 multiple choice questions in paper and posttest design by learning using the Android-based educational game and answer 20 multiple choice questions too in game. Learning achievement was measured using 20 multiple-choice questions scored 1 for correct answers and 0 for incorrect answers. Learning improvement was analyzed using the normalized gain (N-Gain) formula introduced by Hake (1998), as shown in Equation (1).

$$N - Gain = \frac{(Posttest - Pretest)}{(Maximum\ Score - Pretest)} \quad (1)$$

The resulting N-Gain values were then classified into three categories (low, medium, and high) as shown in Table 1. The use of N-Gain is widely adopted in educational effectiveness research to measure the magnitude of learning improvement. After the students finished playing the game, it was time for the evaluation. They were asked to fill out a questionnaire consisting of 10 questions with a response scale ranging from 1 to 5, which would be used as data for calculating the SUS score. SUS is a method used to measure the level of user comfort and ease of use while playing the game. Thus, each student's SUS score is calculated using Equation (2) and averaged across the entire student group. The combination of N-Gain and SUS provides complementary evidence of both learning improvement and user experience, appropriate for an R&D study at this stage.

Table 1. N-Gain classification

N-Gain Score	Category
< 0.3	Low
$0.3 \leq \text{N-Gain} < 0.7$	Medium
≥ 0.7	High

$$\text{SUS Score} = ((R1 - 1) + (5 - R2) + (R3 - 1) + (5 - R4) + (R5 - 1) + (5 - R6) + (R7 - 1) + (5 - R8) + (R9 - 1) + (5 - R10)) * 2.5 \quad (2)$$

RESULTS AND DISCUSSION

Results

The results are presented in three aspects: product development, functional validation, and learning effectiveness. The Android-based educational game *Kisah Teladan Rasul* was developed to support learning of the Prophet's mandatory traits (ṣidq, amānah, tablīgh, and faṭānah) for elementary school students. The game integrates storytelling, mission-based quizzes, character dialogue, immediate feedback, and rewards to support contextual understanding and learning motivation. Initial needs identification was conducted through consultation with the Islamic education teacher at SDN Margorejo 2 Pati. The researchers examined the extent to which students understood the lesson on the Prophet's attributes and agreed to participate in testing at school using game-based learning. The consultation with Islamic education teacher showed that students were familiar with the terms but had difficulty applying the Prophet's mandatory traits in real-life situations; this need was addressed through scenario-based activities in the game.

The development process began by defining the storyboard, target users, platform, and development tools. The storyboard specified the character's mission, learning objectives, and challenge structure, while the platform was set as Android-based mobile devices to ensure accessibility. The target users were elementary school students, while the effectiveness testing was conducted with fourth-grade students due to curriculum alignment. As summarized in Table 2, storytelling provided context, missions facilitated concept application, and rewards enhanced learning motivation.

Table 2. Summary of game development initiation stage

Aspect	Description
Storyboard	Narrative-based missions integrating Prophet's traits into daily-life challenges
Target Users	Elementary school students
Platform	Android mobile/tablet
Development Tool	Unity 2D

The storyboard and game flow were designed to support a gradual learning process suited to elementary students’ cognitive characteristics. During pre-production, scenes were organized hierarchically to ensure logical progression between learning missions, as shown in the Visual Table of Contents in Figure 2. This structure supports step-by-step learning from concept introduction to reinforcement.

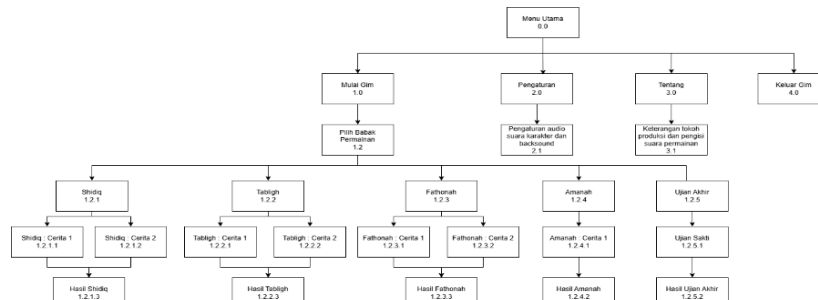


Figure 2. Visual table of contents (vtoc) of the game structure

The storyboard structured narrative missions, character interactions, and feedback mechanisms. The storyboard design implemented in the game demonstrates how instructional objectives were embedded into the gameplay narrative. Following the storyboard finalization, child-friendly 2D character assets were integrated into the Unity environment, as shown in Figure 3, to support visual engagement during gameplay.



Figure 3. 2D character assets integrated into the game

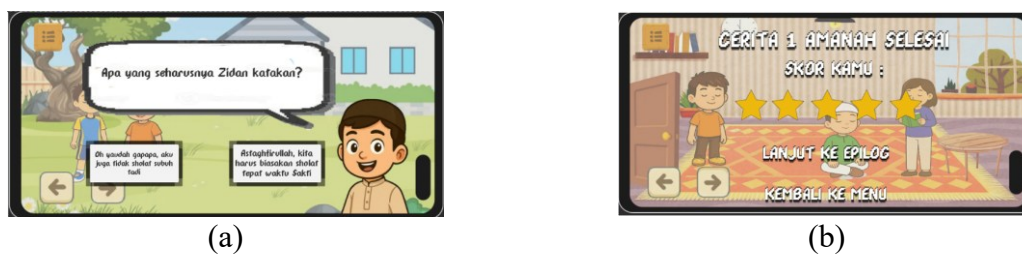


Figure 4. (a) Question interface and feedback notification; (b) Star-based scoring result

In the production stage, visual assets, sound effects, background music, and dialogue scripts were integrated into the system. Each story representing one of the Prophet’s mandatory traits, players are given a mission that initiates the narrative sequence. After completing the initial mission, the game presents a dialogue segment followed by multiple-choice questions, as illustrated in Figure 4(a). Players also receive notifications indicating whether their answers are correct or incorrect. Each round consists of five questions, and players earn stars according to the number of correct answers. An example of the scoring result is shown in Figure 4(b), where a player who answers all five questions correctly receives five stars at the end of the story. After the participants have completed all the sections on the characteristics of the

prophets, the final section of the game consists of a review of all the characteristics, comprising 20 questions. These results will serve as the post-test data for each student.

Functional feasibility was evaluated using black-box testing because black-box testing can assist identifying the problem while test the game. All navigation buttons, scene transitions, scoring calculations, and audio components operated correctly without errors. This system stability is important because technical disruptions may interfere with students' concentration and the continuity of game-based learning activities. The detailed functional testing results are summarized in Table 3, indicating that each tested feature met the expected outcome.

Table 3. Black-box functional testing results

No	Test Component	Expected Result	Result
1	Navigation buttons	All buttons function correctly	Valid
2	Audio settings	Adjustable volume and stable playback	Valid
3	Game flow	Smooth transition from start to finish	Valid
4	Score display	Accurate final score calculation	Valid

Beta testing was conducted at SDN Margorejo 2 Pati involving 19 fourth-grade students (6 boys and 13 girls), selected due to curriculum alignment because the topic of the Prophet's mandatory traits is formally introduced at this level. The implementation was carried out during the Islamic education class, where students used their own mobile phones with prior approval from the principal and the Islamic education teacher. Students were asked to complete 20 questions from a worksheet provided by the researcher as part of the pretest. They were allowed 40 minutes to complete the questions and were permitted to consult the material in their respective workbooks. After the pretest was completed, students were allowed to take out their mobile devices to begin the posttest, which consisted of playing a game. During the classroom session, students interacted individually with the game on their own mobile devices, while the teacher provided initial instructions and monitored students' participation throughout the activity. The teacher also tried the game during the session to observe its instructional suitability for future classroom use; however, the teacher's data were not included in the effectiveness analysis. The students engaging with the game during classroom learning. Pretest and posttest assessments were administered to measure learning improvement.

Table 4. Recapitulation of student learning outcomes (n = 19)

No	Name	Pretest	Posttest	N-Gain	No	Name	Pretest	Posttest	N-Gain	
1	R1	12	16	0.50	11	R11	12	17	0.63	
2	R2	12	16	0.50	12	R12	11	17	0.67	
3	R3	14	17	0.50	13	R13	13	17	0.57	
4	R4	10	16	0.60	14	R14	14	18	0.67	
5	R5	15	18	0.60	15	R15	15	20	1.00	
6	R6	14	17	0.50	16	R16	18	20	1.00	
7	R7	15	19	0.80	17	R17	8	15	0.58	
8	R8	16	20	1.00	18	R18	8	15	0.58	
9	R9	15	20	1.00	19	R19	12	17	0.63	
10	R10	11	18	0.78						
Total N-Gain Scores							13.11			

As shown in Table 4, the total N-Gain score obtained from the 19 students was 13.11, resulting in an average N-Gain value of 0.69. The graph in Figure 5 also shows that the difference between the pretest and posttest scores for the average student indicates an increase. Based on the N-Gain classification presented in the Method section, this value falls within the

medium category ($0.3 \leq g < 0.7$), indicating a meaningful improvement in students' understanding after using the educational game. The variation in N-Gain scores suggests differences in students' priority understanding and levels of engagement during gameplay.

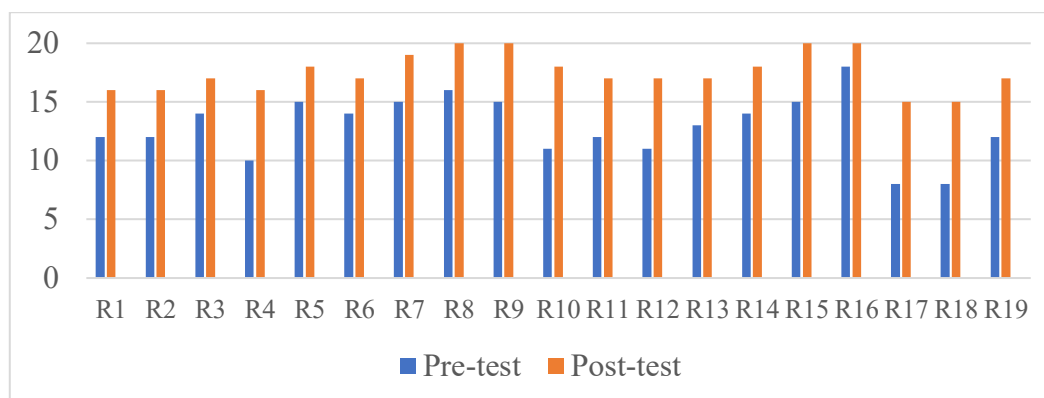


Figure 5. Comparison chart of pretest and posttest scores

Table 5. SUS evaluation results

Evaluation Aspect	Score / Category	Description
Average SUS Score	90.1	Excellent
SUS Grade	A	Best Imaginable
Acceptability	Highly Acceptable	Ready for classroom user

Following the calculation of the N-Gain scores, the analysis proceeded with the evaluation of the collected SUS questionnaire data. As shown in Table 5, the mean SUS score among all fourth-grade students reached 90.1, which is categorized as Excellent (Grade A, Acceptable), indicating that students experienced a high level of comfort and ease when using the “Kisah Teladan Rasul” game application. This high usability rating underscores the effectiveness of a child-centered visual design, incorporating intuitive navigation, vibrant color schemes, and 2D animated characters appropriate for elementary school learners. Overall, these findings indicate that the game not only provided a user-friendly experience but also consistently supported improvements in students' conceptual understanding across participants.

Discussion

The findings indicate that the Android-based educational game *Kisah Teladan Rasul* effectively supports students' understanding of the Prophet's mandatory traits, as reflected in the N-Gain score 0.69 (medium category). The SUS score of 90.1 positions the game within the Excellent range, indicating that students perceived the interface as highly usability and engaging. While these results demonstrate positive learning outcomes, it is important to examine the underlying mechanisms that explain how such improvements occurred (Deshmukh & Chalmeta, 2024). The learning gains can be attributed to several interconnected processes. First, situated cognition is activated through scenario-based gameplay, allowing students to engage with moral concepts within meaningful and context-rich situations rather than abstract definitions. Second, the design supports the experiential learning cycle, where students undergo stages of experience (gameplay interaction), reflection (feedback and consequences), and application (decision-making in subsequent scenarios). Third, the use of visual and interactive elements contributes to cognitive load reduction, enabling students to process abstract moral concepts more effectively. Finally, intrinsic motivation is enhanced through immediate feedback, rewards, and goal-oriented challenges, which sustain engagement

and reinforce learning. These findings suggest that learning improvement is not solely driven by content delivery but by the interaction between cognitive, experiential, and motivational mechanisms embedded within the game design.

These findings support the principles of game-based learning (GBL), which emphasize that meaningful gameplay combined with clear instructional objectives can enhance cognitive engagement and knowledge retention (Kacmaz & Dubé, 2022; Sun et al., 2024). However, this study extends existing GBL theory by demonstrating that, in the context of moral education, gameplay not only increases engagement but also facilitates situated moral reasoning, a dimension that has been relatively underexplored in prior literature. The effectiveness of GBL in this study is driven by the integration of contextual decision-making, feedback mechanisms, and motivational elements, which together support deeper cognitive and reflective processes. This aligns with constructivist and experiential learning perspectives, where learners actively construct understanding through interaction and reflection rather than passive memorization. Thus, the findings provide further evidence that GBL can function not only as an engagement tool but also as a medium for supporting complex and abstract learning processes such as moral internalization.

The results are consistent with findings reported by the broader literature on game-based learning. Wang et al. (2022) conducted a meta-analysis of 33 studies and found that digital game-based STEM education produced a moderate overall effect size ($ES = 0.667$) on student learning achievement compared to conventional methods. In the specific context of mathematics, Hui & Mahmud (2023) confirmed through a systematic review of 28 studies that game-based learning positively impacts students' cognitive domain outcomes, including knowledge gains and mathematical skills. Similarly, Gui et al. (2023) reported a medium to large general effect ($g = 0.624$) of digital educational games over conventional STEM learning across 86 studies, reinforcing that game-based approaches consistently yield medium category learning gains a finding aligned with the N-Gain results obtained in the present study. This method does not work properly if the N-Gain result is less than 0.3, which indicates the "Low" category. However, differences in outcomes may be influenced by the nature of the learning content, as science and computational domains focus on procedural skills, while this study addresses abstract moral concepts. As a result, learning in this domain requires not only comprehension but also contextual interpretation and internalization. The findings suggest that scenario-based interaction plays a critical role in bridging this complexity by providing meaningful contexts for decision-making. This highlights that the effectiveness of GBL is not uniform across domains but is influenced by the nature of the learning content and the design of instructional experiences (Deghedi, 2023).

This study provides several important contributions by extending GBL frameworks through the introduction of moral internalization via scenario-based gameplay, demonstrating how interactive digital environments can support situated moral reasoning and experiential learning processes. In the context of moral education, the findings suggest that game mechanics can move beyond engagement to facilitate deeper cognitive and reflective processes. The results further emphasize the importance of aligning narrative, interaction, and feedback mechanisms to support meaningful learning outcomes. Pedagogically, the study demonstrates that abstract moral values can be effectively operationalized into interactive learning experiences, thereby connecting conceptual understanding with real-life application (Puspitarini et al., 2023).

The findings should be interpreted with caution due to several limitations. The use of a one-group pretest–posttest design limits internal validity, as improvements cannot be exclusively attributed to the intervention without comparison to a control group. Additionally, the possibility of a novelty effect cannot be ignored, as students may respond positively to the use of new technology rather than the instructional content itself. Furthermore, the use of N-

Gain as a measurement focuses primarily on conceptual improvement and may not fully capture deeper moral internalization or long-term behavioral change. Future research should address these limitations by employing experimental or quasi-experimental designs to strengthen causal inference. Longitudinal studies are also recommended to examine the long-term impact on students' moral behavior and value internalization. In addition, cross-context or cross-cultural validation is necessary to evaluate the generalizability of the findings across different educational and cultural settings. Such approaches would provide a more comprehensive understanding of the effectiveness of game-based learning in moral education.

CONCLUSION

This study confirms that gamified mobile learning can effectively support elementary students' understanding of the Prophet's mandatory traits and strengthen the internalization of Islamic moral values through interactive digital experiences. The study contributes pedagogically by integrating game-based learning into Islamic character education, methodologically by applying the ADDIE model in educational game development, and empirically by providing quantitative evidence of learning improvement through N-Gain analysis. The SUS evaluation yielded a mean score of 90.1 (Excellent, Grade A, Highly Acceptable), demonstrating strong user acceptance among fourth-grade students. Theoretically, the findings reinforce constructivist and experiential learning perspectives, highlighting how interactive and contextual digital environments facilitate deeper understanding beyond memorization. The findings indicate that mobile-based educational games can function as complementary media to enrich religious instruction in elementary classrooms. However, the limited sample and one-group design restrict broader generalization. Future studies should employ experimental designs, involve larger and more diverse samples, and examine the long-term effects of educational games on students' moral understanding and behavior.

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