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Religious Board Design: An Augmented Reality-Based Interactive Learning Media Prototype for Enhancing Religious Literacy in Islamic Education

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A B S T R A C T

Islamic Religious Education (PAI), particularly Islamic History (Tarikh Islam), is often delivered through textual and teacher-centered approaches that may limit student engagement and religious literacy development. This study aims to design and develop an interactive learning media prototype, namely the RELIGI BOARD, which integrates gamification and Augmented Reality (AR) to support Islamic History learning at the junior high school level. The research employed a Research and Development approach, adopting the first three stages of the ADDIE model: Analysis, Design, and Development. Data were collected through needs analysis interviews with teachers and analyzed using qualitative descriptive methods to examine the design feasibility and theoretical foundation of the media. The results indicate that the RELIGI BOARD prototype is functionally and structurally feasible as an interactive learning medium. The integration of board game mechanics with AR-based visualizations supports the presentation of abstract historical concepts in a more concrete and engaging form. From a theoretical perspective, the convergence of gamification principles and AR technology offers a potential solution to motivational and cognitive challenges in Islamic History learning. Although limited to the prototype development stage, this study suggests that the RELIGI BOARD has potential as an innovative learning media to support religious literacy in Islamic Education.

1. Introduction

In the current era of digital disruption, educational challenges are no longer limited to cognitive academic achievement, but also include strengthening the spiritual, moral, and character capacities of the younger generation. Children and adolescents are now exposed to a rapid and diverse flow of religious information from digital

media, ranging from hoaxes about religious history, which creates new stigmas about religion, often without filtering and with minimal context (Lestari & Saidah, 2023). This situation demands that they adapt more quickly and have strong religious literacy, namely the ability to analyze, understand, and practice religious teachings in a moderate and contextual manner. In this context, Islamic Religious Education (PAI) has a very urgent role as the foundation for the character and spiritual awareness of students at the junior high school level.

The reality on the ground shows a gap between expectations and reality. Although the Qur'an Literacy Index (reading ability) in Indonesia shows a high category (Survei Kemenag et al., 2023), findings from the Center for Religious Literature and Heritage Research and Development in 2016 noted that aspects of religious contextual understanding and reasoning were still in the moderate to low category. This problem is exacerbated by the low level of basic literacy among students nationwide; OECD data in 2019 shows that Indonesia ranks 62nd out of 70 countries in literacy levels (Kemenko, 2021). These literacy limitations greatly affect students' ability to understand PAI material that is narrative and historical in nature, such as Islamic History, which requires in-depth analysis and interpretation.

This gap is exacerbated by the conventional methods and styles of teaching Islamic Education in the classroom (Risana et al., 2025). History is often taught in a cognitive-centric manner, focusing on memorizing dates and names of historical figures, with little emphasis on the relevance of historical values to contemporary life. This has been proven to cause low student interest in learning, lack of concentration, and lack of active participation in the learning process, as reported in various studies at the junior high school level. The fact is that today's children and teenagers are a generation of digital natives who are more familiar with and interested in technology-based things, interactive media, gamification, and other digital content. This means that it is necessary to emphasize the need for change or continuity in methodology.

Research by Mual, entitled "Development of Educational Board Games with Augmented Reality Technology (Case Study of Snakes and Ladders)". The game designed in this study uses the Iterative Rapid Paper Prototype method to find out the elements that are fun, attract children to learn and play, and provide a good experience in testing the interactivity of Augmented Reality presented in the game. The results of the testing conducted through fun testing, pre-testing, and post-testing after the respondents played the snakes and ladders game showed an overall average score of 92. This shows that the snakes and ladders game built with this concept can influence children's concepts in learning mathematics and improve their ability to answer mathematics questions (Mual et al., 2019). This means that the Augmented Reality technology approach can help address literacy issues among children and adolescents.

The difference between previous research and this study is that previous research focused on the development of board games with a case study using the snake and ladder game. Meanwhile, this study is more directed towards the design of a

religious board, with a focus on improving religious literacy in PAI learning. Both studies use the Augmented Reality technology approach.

Ritonga's research, in his study entitled "Development of Augmented Reality-Based Smart Board Learning Media for Animal Recognition in Early Childhood," used a research and development (R&D) method. It used the ADDIE development model research procedure. The results of the trial were 85.6%, meaning that the learning media product is suitable for use in the process of teaching animal recognition to early childhood. Therefore, Augmented Reality-based smart board learning media is very effective and influential in improving the cognitive abilities of early childhood, especially in animal recognition (Ritonga et al., 2022).

Despite the promising findings of previous studies, several limitations remain evident. Most existing research on Augmented Reality-based learning media focuses on non-religious content or early childhood education and primarily emphasizes effectiveness testing rather than design-oriented development. In addition, previous studies rarely address Islamic History learning, which involves abstract narratives, moral values, and contextual interpretation, nor do they explicitly frame religious literacy as a multidimensional learning outcome. Therefore, this study occupies a unique position by focusing on the design and feasibility of an Augmented Reality-based Religious Board prototype aimed at supporting religious literacy in Islamic History learning for junior high school students.

Based on the description of the problem and analysis of the problem at SMP Muhamamdiyah 1 Gatak in Grade VIII Islamic History, which still uses lecture methods and textbook media that seem monotonous, there is a need for a learning system that leads to experiential learning and is able to bridge PAI material with the digital world of students. This study proposes the Religious Board Design as a prototype for interactive learning media to address these challenges. By adopting a board game mechanism (like Monopoly) involving pieces, cards, and challenges, the religious board transforms rigid Islamic history material into an active and collaborative literacy journey. The main innovation lies in the integration of Augmented Reality (AR) on the cards and game board. The main objective of this study is to produce a systematic, comprehensive, and implementable Augmented Reality-based Religious Board design as a prototype for interactive learning media in Islamic Religious Education.

2. Methodology

Research Design

This study employed a design-oriented Research and Development (R&D) (Reinaldi, 2020). The R&D framework was used to guide the systematic development of an Augmented Reality (AR)-based learning media prototype, namely the Religious Board. The development procedure followed the ADDIE model, limited to the first three stages: Analysis, Design, and Development. This

limitation aligns with the research objective of producing a functional and theoretically grounded prototype rather than conducting large-scale implementation or evaluation. (Andi Rustandi & Rismayanti, 2021). The development process of the RELIGI BOARD learning media was guided by a structured Research and Development framework using the ADDIE model. To maintain methodological consistency with the research objectives, this study focused only on the first three stages of the model, namely Analysis, Design, and Development. The overall research design and development flow are illustrated in Figure 1.

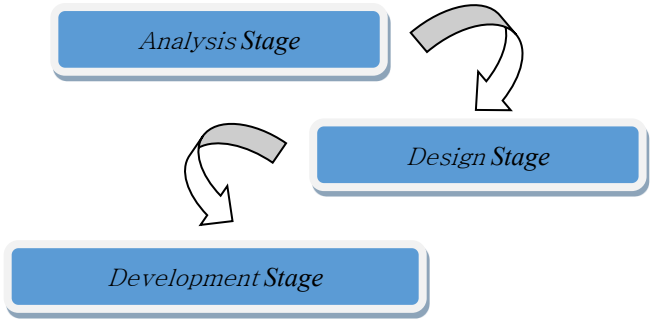

Figure 1. ADD Research Method

As shown in Figure 1, the research procedure follows a sequential and iterative process, beginning with needs analysis, followed by instructional and media design, and culminating in prototype development. By limiting the ADDIE stages to Analysis, Design, and Development, this study emphasizes the production of a functional and theoretically grounded prototype rather than large-scale implementation or effectiveness evaluation. This approach ensures methodological clarity and aligns the research process with the study's design-oriented objectives.

Instruments

The main instruments used in this study included:

1. Interview Guidelines, used to conduct needs analysis with Islamic Religious Education (PAI) teachers regarding learning challenges, curriculum relevance, and media requirements.
2. Observation Sheets, used during limited trials to document students' interaction, engagement, and ease of use with the Religious Board prototype.
3. Documentation Checklists, used to record design outputs such as storyboards, flowcharts, board layouts, card designs, and AR visualization assets.

The researcher acted as the primary research instrument, supported by these tools to ensure systematic data collection.

Data Collection

Data collection was conducted in three stages corresponding to the ADDIE framework:

1. Analysis Stage: Literature review, curriculum analysis, and semi-structured interviews with PAI teachers at SMP Muhammadiyah 1 Gatak were conducted to identify learning problems and media specifications.
2. Design Stage: Based on the analysis results, instructional designs, game mechanics, storyboards, and AR interaction flows were developed.
3. Development Stage: The Religious Board prototype was produced in both physical (board, cards, game pieces) and digital forms (AR markers and 3D visualizations). Limited trials were conducted with a small group of eighth-grade students to obtain initial responses regarding usability and attractiveness.

Data Validation

To ensure the trustworthiness and validity of the development results, several validation techniques were applied:

- Source Triangulation, by comparing data obtained from teachers and students.
- Technique Triangulation, by combining interviews, observations, and documentation analysis.
- Expert Judgment, involving feedback from PAI teachers and media design experts to assess the appropriateness and feasibility of the prototype design.

These strategies were used to strengthen the credibility and dependability of the findings.

Data Analysis

Data analysis was conducted using qualitative descriptive techniques. Interview and observation data were analyzed through data reduction, data display, and conclusion drawing. The analysis focused on identifying design feasibility, alignment with pedagogical principles, and theoretical consistency with gamification and cognitive learning frameworks. The results of the analysis were used to refine the prototype and to formulate conclusions regarding the feasibility of the Religious Board as an interactive learning media prototype.

3. Results and Discussion

Result

The research and development conducted by the author has successfully constructed a prototype of the RELIGI BOARD interactive learning media, integrating the gamification mechanism of the board game model with Augmented Reality (AR) technology. This prototype is specifically intended as a pedagogical intervention to optimize the religious literacy of junior high school students through strengthening their understanding of Islamic history material, which is narrative and abstract in nature. This discussion presents a detailed interpretation of the internal validity of the product design, compiled based on the stages of media development that refer to the modified ADDIE model (Analysis, Design, and Development).

Furthermore, this discussion internalizes qualitative empirical data related to user responses and initial perceptions, with an emphasis on the theoretical justification that the convergence of gamification and AR can serve as an effective catalyst in overcoming motivational barriers and facilitating visual recognition of historical content. The overall analysis is presented to determine the functional feasibility of the prototype for further validation studies and extensive implementation.

Analysis

was conducted to identify the gap between the ideal conditions of students' religious literacy and the reality of Islamic History PAI learning practices in schools. Based on in-depth interviews with PAI teachers, it was found that Islamic history material is often delivered through lectures and memorization, causing students to have difficulty understanding ibrah (contextual values) and lack motivation. The learning interests of students, who are part of the digital generation, demand more visual, interactive, and gamification-based media. This need confirms the need for media that can integrate Islamic History content with Augmented Reality (AR) technology to visualize abstract concepts. The results of this analysis then became the basis for media design.

Design

Based on the identified needs, a conceptual design of RELIGI BOARD was carried out, adopting a board game mechanism and targeting Islamic History material for Grade VIII junior high school. This design includes three main components:

a. Main Board Design: The board is designed as a "Map of Islamic Literacy and Civilization," consisting of 24 squares divided into four action corners (Hijrah Point, Faith Test, Muhasabah, Literacy Center) and three types of repeating side squares: AR Civilization Squares (testing historical knowledge and triggering 3D visuals of Abbasid, Umayyad, etc. icons), Ibrah Role Play Squares (testing the application of values), and Fadilah Squares (motivation bonuses).

b. Card Design: Two types of cards are designed, namely the Challenge Date Card (to test specific knowledge) and the Muhasabah Card (to trigger reflection on religious values).

c. AR Design: The main icons on the Civilization Box (e.g., Baitul Hikmah icon, Muslim figures, wayang puppets, ancient ships) will function as markers or triggers, where the device's camera will project relevant 3D visualizations of the material in real-time.

Prototype Development

Realization of the design into a functional product. The RELIGI BOARD prototype was developed in two dimensions: (1) Physical products in the form of game boards, pieces, and printed cards, and (2) Digital products in the form of 3D assets and AR application deployment using a low-code platform to ensure that all markers on the

board can trigger the designed visualizations. The resulting prototype is then used as an instrument in limited trials to obtain initial feedback from users.

Religi Board Simulation

Religi Board functions as a simulation of literacy and history, where each square visited by the player represents a challenge that tests their understanding, application, and reflection of Islamic values. The overall structure and layout of the RELIGI BOARD learning media are designed to guide students through a sequential literacy journey. The complete design of the board, including its functional squares and learning zones, is presented in Figure 1.

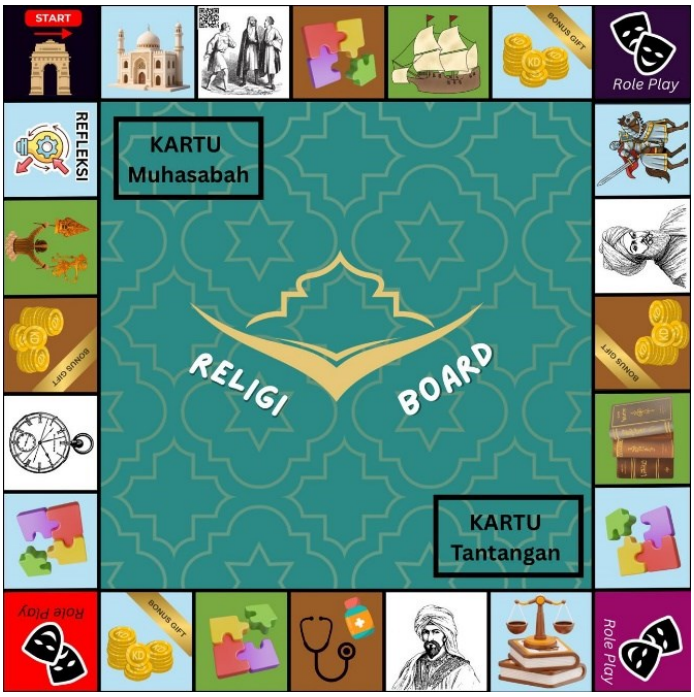

Figure 1. Display of the Religious Board
(Source: Author 2025)

As illustrated in Figure 1, the board layout integrates cognitive, affective, and reflective learning components through differentiated square functions. This design enables students to engage with Islamic History content not only through factual recall but also through value application and self-reflection, supporting a more holistic form of religious literacy. Instructional cards play a central role in guiding students' interactions during the simulation. The design and function of the Muhasabah Card and Challenge Card are shown in Figure 2.

Figure 2. Muhasabah Card & Challenge Card Display
(Source: Author 2025)

The use of these cards supports both cognitive engagement and reflective learning by prompting students to connect historical knowledge with ethical reasoning. This mechanism reinforces the role of the RELIGI BOARD as a learning media that integrates knowledge acquisition with value internalization.

1. Initiation Stage (Hijrah Point/Start)

   The game begins at the Hijrah Point (START) box. At this stage, each player is positioned at the starting box, takes their character piece, and ensures that they have prepared a mobile device that can scan Augmented Reality barcodes. The first roll of the dice marks the beginning of the Literacy Journey on the RELIGI BOARD Civilization Map. This initiation stage serves as a confirmation of the students' technical and mental readiness to interact with Islamic History material in an interactive manner.

2. Knowledge Exploration Stage (AR Civilization Box)

   When the piece stops at one of the AR Civilization Boxes (for example, the Baitul Hikmah icon), the player scans the marker in the box using a mobile device. The AR application then visualizes the 3D Civilization Model or related Historical Animation. After the visualization, the player will be given a brief informative explanation, and is expected to understand the explanation, as it will later be used as material for reflection for the player.

3. Value Application Stage (Ibrah Role Play Box)

   To measure value application literacy (Affective), players who stop at the Ibrah Role Play Box will receive a Case Study Card. This card presents an ethical dilemma or modern conflict (e.g., corruption or intolerance) that must be resolved by the player by taking the perspective (role play) of an Islamic historical figure (e.g., an Abbasid scientist). The solutions presented by players must be based on lessons learned from Islamic history materials and brief explanations obtained during the literacy journey.

4. Motivation Reinforcement Stage (Rewards and Challenges)

   During the simulation journey, interactions are enriched through the Virtue Box (Bonus Virtue). When players stop at this box, they receive rewards in the form of Literacy Points and Virtual Titles (e.g., Traveler of Knowledge), which aim to motivate engagement and maintain enthusiasm for learning. The Virtue Box serves as an appreciation for the players' progress in their literacy journey, ensuring that the Islamic History PAI learning process is enjoyable and valued, thereby encouraging students to continue to actively participate and complete the material.

5. Reflection Stage (Muhasabah)

   The literacy journey ends at the Muhasabah Point or by taking the Muhasabah Card. At this stage, players are invited to reflect on their experiences, historical challenges, and the values they have applied during the game. This reflection stage serves as a self-evaluation (Muhasabah) that strengthens the internalization of the religious values that have been learned.

To ensure that the RELIGI BOARD simulation is conducted in a systematic and structured manner, the overall gameplay process is designed through a sequential interaction flow. The stages of player interaction, from initiation to reflection, are illustrated in Figure 3, which presents the technical gameplay flowchart of the RELIGI BOARD learning simulation.

Figure 3. Gameplay Flowchart
(Source: Author 2025)

As shown in Figure 3, the gameplay flow integrates cognitive, affective, and reflective learning stages into a single learning cycle. This structured flow ensures that students not only engage with Islamic History content through exploration and challenges but also conclude the learning process with guided reflection. Such a sequence supports meaningful learning by aligning gameplay mechanics with pedagogical objectives in Islamic Religious Education.

Augmented Reality plays a central role in visualizing abstract Islamic History content within the RELIGI BOARD prototype. The implementation of AR visualization, accessed through mobile devices by scanning markers on the board and cards, is presented in Figure 4.

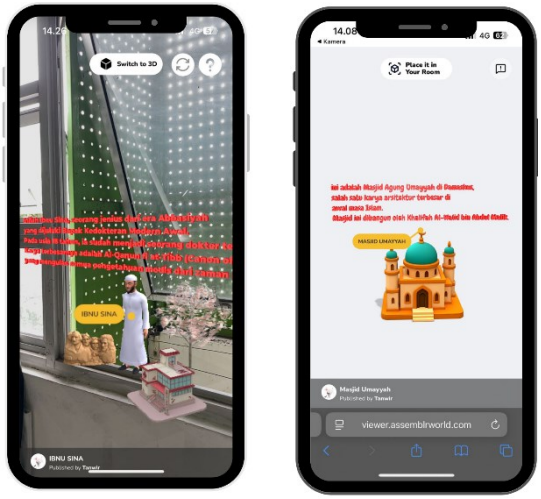

Figure 4. Augmented Reality Display
(Source: Author 2025)

Figure 4 demonstrates how three-dimensional historical objects and narratives are displayed in real time through AR technology. This visualization supports students in understanding complex historical concepts more concretely and reduces reliance on textual imagination alone. As a result, the AR display enhances cognitive engagement and supports the development of religious literacy by bridging abstract historical narratives with visual learning experiences.

Discussion

Theoretical Analysis of the Convergence between Augmented Reality and Gamification in the RELIGI BOARD

This discussion represents the core scientific argument of the study, connecting the outputs of the development stage with relevant learning theories and previous research. Rather than claiming empirical effectiveness, this section critically analyzes how the integration of Augmented Reality (AR) and gamification in the RELIGI BOARD prototype is theoretically positioned to address cognitive and motivational challenges in Islamic History learning and to support the development of religious literacy.

The Contribution of Augmented Reality in Optimizing Cognitive Efficiency

The integration of Augmented Reality within the AR Civilization Boxes of the RELIGI BOARD directly addresses the challenge of abstract conceptualization commonly found in Islamic History learning. Historical narratives such as the development of Islamic civilization, architectural structures, and intellectual

institutions often require learners to mentally construct complex three-dimensional representations based solely on textual descriptions (Yağcı & Bölükbaşı Ertürk, 2025). According to Cognitive Load Theory, such conditions may generate excessive extraneous cognitive load, which interferes with meaningful learning processes (Skulmowski & Xu, 2022).

By presenting real-time three-dimensional visualizations through AR markers embedded in the board and cards, the RELIGI BOARD prototype reduces unnecessary cognitive demands associated with imagination and visualization. Learners are no longer required to mentally translate two-dimensional text into three-dimensional concepts, allowing cognitive resources to be redirected toward intrinsic processing, namely understanding historical meaning and contextual religious values. This mechanism aligns with the principles of Multimedia Learning Theory, which emphasizes dual-channel processing through visual and verbal information to enhance comprehension (Rahman et al., 2025). Previous studies have shown that AR-assisted interactive multimedia is highly feasible and effective for improving learning outcomes, as indicated by a substantial increase in students' posttest performance and a high N-gain score (Khusnunnisa' & Andriani, 2025).

From a religious literacy perspective, this cognitive efficiency is particularly significant. Religious literacy does not merely involve recalling historical facts but requires learners to interpret values, understand context, and reflect on moral lessons derived from historical events (Levstik & Barton, 2022). AR-supported visualization functions as a cognitive scaffold that bridges abstract historical narratives with concrete representations, thereby facilitating deeper comprehension without increasing cognitive overload (Voulgari et al., 2024). Within this framework, AR serves not as a decorative feature but as a pedagogically grounded tool that supports meaningful learning (Hamzah et al., 2025). Augmented Reality-integrated learning media has been reported as practical to use and effective in significantly improving students' learning outcomes, with high average N-gain results in pretest–posttest designs (Septiani et al., 2025). The AR-based learning media was found to be highly valid, feasible, and attractive, as evidenced by a validity score of 88.18%, a teacher feasibility score of 100%, and a student attractiveness score of 93.15%, indicating strong user acceptance and suitability for classroom learning (Zahro et al., 2024). The development results indicated that the AR-based learning media was highly valid and attractive, as shown by expert validation scores (material expert 100%, media expert 93.75%, and language expert 87.5%) and a student attractiveness score of 94.61%, supporting the feasibility of AR learning media for classroom implementation (Muti'ah et al., 2024).

The Role of Gamification in Supporting Intrinsic Motivation

In addition to cognitive considerations, the RELIGI BOARD prototype incorporates structured gamification elements to address motivational challenges in Islamic History learning. Traditional instructional approaches often position learners as passive recipients of information, which may limit engagement and sustained interest (Li et al., 2025). Drawing on Self-Determination Theory,

motivation is more likely to be sustained when learning environments support learners' needs for competence, relatedness, and autonomy (Luo et al., 2021).

The Literacy Points system and reward mechanisms embedded in the game structure contribute to learners' sense of competence by providing immediate feedback on task completion and decision-making. This feedback reinforces learners' perception of mastery and progress, which is closely associated with intrinsic motivation. Importantly, competence in this context is linked not only to factual recall but also to the application of religious values through role-play and reflective tasks (Harahap, 2025).

The board game format further supports relatedness by encouraging collaborative interaction among players. Activities such as Ibrah Role Play simulations require learners to discuss, negotiate, and reflect collectively, transforming Islamic History learning into a social process. This social dimension is essential in religious education, where values and meanings are often constructed through dialogue and shared reflection (Harahap, 2025). Autonomy is supported through learners' active participation in decision-making processes within the game, including strategic movement and moral reasoning during role-play scenarios. Although bounded by game rules, these choices provide learners with a sense of agency and ownership over their learning experience. Such autonomy reinforces motivation without compromising instructional structure (Ivone et al., 2024).

Synergistic Implications for Religious Literacy Development

The convergence of Augmented Reality and gamification in the RELIGI BOARD prototype illustrates a complementary relationship between cognitive efficiency and motivational support. While AR facilitates clearer conceptual understanding by reducing extraneous cognitive load, gamification sustains learner engagement by addressing psychological needs. Together, these elements create a learning environment that is theoretically aligned with the multidimensional nature of religious literacy, encompassing understanding, reflection, and value application (Sirait & Olis, 2024). Students' responses indicated a very high level of feasibility (97%), suggesting that the AR-based storybook was perceived as engaging, easy to use, and effective as a literacy learning medium (Jannah et al., 2025). Although this study is limited to the design and feasibility analysis of a prototype, the theoretical grounding suggests that the RELIGI BOARD has strong pedagogical potential as an innovative learning media in Islamic Religious Education. Future studies are needed to empirically examine its impact on learning outcomes and religious literacy development across broader educational contexts.

4. Conclusion

This research and development aims to construct a prototype of interactive religious learning media based on Augmented Reality (AR) and Gamification, as well as to test the feasibility of the developed model. Based on the development procedure using a modified ADDIE model (Analysis, Design, and Development), and

interpretation of the design validity. Model Feasibility and Internal Validity of the Religious Board The Religious Board learning media prototype is declared theoretically and functionally feasible for further development. This feasibility is supported by the internal validity of the design, which integrates pedagogical and technological aspects in a structured manner. Theoretically, the convergence of gamification mechanisms (based on SDT) and AR technology (based on Cognitive Load Theory) effectively overcomes dualistic barriers, namely the difficulty of abstracting Islamic History material and the motivation deficit found in the needs analysis stage. This product design successfully combines the physical interaction of board games with the visual richness of AR, creating a comprehensive literacy journey simulation. Thus, the Religious Board is a design-valid innovation with the potential to become a powerful pedagogical intervention in efforts to optimize Religious Literacy in Islamic History material.

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