

Gamified Project-Based Learning for Digital Hajj Training: A Systematic Literature Review on Procedural Understanding and Practical Skills

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ABSTRACT

This study aims to analyze the characteristics, approaches, and effectiveness of Gamified Project-Based Learning (GPBL), as well as examine its role in supporting the development of procedural understanding and practical skills in digital hajj training. The method used is Systematic Literature Review (SLR) with the PRISMA procedure on articles obtained from the Scopus database using keywords related to GPBL, procedural understanding, practical skills, and digital learning. Of the 115 articles identified, 14 articles met the inclusion criteria, namely Scopus indexed articles published in the 2020–2026 range and discussed the implementation of GPBL, procedural understanding, practical skills, or digital learning in the context of education. The results of the study show that GPBL has the characteristics of project-based active learning that is integrated with gamification so that it is able to increase student involvement, motivation, and learning outcomes. In addition, practice-based learning has been shown to strengthen procedural understanding through systematic and contextual learning experiences. Interactive digital media combined with gamification and project activities also support the development of practical skills more effectively. The main theoretical impact of the synthesis of 14 articles suggests that GPBL serves as a pedagogical framework that connects procedural understanding with practical skills through active, collaborative, and meaningful learning experiences. This study concludes that the integration of GPBL, procedural understanding, and digital learning is a potential approach in supporting the development of more effective digital hajj training.

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1. INTRODUCTION

The development of digital technology and the transformation of 21st century education have driven a paradigm shift in learning from teacher-centered to student-centered. This change requires the implementation of learning strategies that are able to increase engagement, motivation, collaboration,

creativity, and problem-solving skills simultaneously. One of the approaches that has received a lot of attention in recent years is Gamified Project-Based Learning (GPBL), which is the integration of project-based learning with gamification elements to create a more engaging and meaningful learning experience. Various studies show that GPBL is able to increase student engagement through project activities that are challenging, collaborative, and oriented towards solving real problems (Díaz-Lauzurica & Moreno-Salinas, 2026). In addition to increasing engagement, GPBL also reportedly contributes to increasing students' intrinsic and extrinsic motivation through the use of challenges, rewards, feedback, and structured achievement mechanisms (Y. Zhang & Watson, 2025). A systematic study conducted by Huang et al. (2023) shows that the implementation of GPBL has a positive impact on learning outcomes, learning experiences, and the development of 21st-century skills such as critical thinking, creativity, communication, and collaboration. The findings suggest that GPBL is evolving as a pedagogical approach that focuses not only on academic achievement, but also on the development of active and meaningful learning experiences (Bai et al., 2020; Dichev & Dicheva, 2017). These findings are in line with various cutting-edge studies that show that the integration of gamification with project-based learning can improve the engagement, motivation, self-regulation, and quality of students' learning experiences in various digital education contexts (Lampropoulos & Kinshuk, 2024; Sailer & Homner, 2020; Zainuddin et al, 2020). Therefore, GPBL is one of the relevant approaches to answer the needs of modern learning that requires the active involvement of students in building knowledge and skills independently.

On the other hand, improving the quality of learning is not only determined by motivation and learning involvement, but also by the ability of students to understand and implement procedures appropriately. Procedural understanding refers to the ability to understand the sequence of steps, rules, and actions that must be taken to complete a task or achieve a certain goal (Choi et al., 2023). In various learning contexts, procedural understanding is an important component because it relates to the ability of students to apply knowledge operationally and systematically. Arnold et al. (2023) explains that procedural understanding includes not only the ability to follow certain steps, but also understanding the reasons and logic underlying each of those procedures. The research of Lenz et al. (2024) It shows that the development of procedural and conceptual knowledge does not always take place in a balanced manner, so a learning approach that is able to connect the two effectively is needed. In addition, Keazer and Phaiah (2023) emphasizing that the boundaries between conceptual and procedural understanding are often difficult to separate in learning practice because they complement each other in the process of knowledge construction. In the context of practical learning, mastery of procedures becomes increasingly important because learning success is not only measured by understanding theory, but also the ability of students to apply procedures correctly and consistently. Therefore, the development of procedural understanding needs to be supported by learning strategies that allow learners to gain an active, structured, and contextual learning experience. This view is also supported by recent studies emphasizing that conceptual and procedural knowledge develop iteratively through well-designed instructional experiences (Hurrell, 2021).

Practice-based learning and the use of digital technology are one of the approaches that are considered effective to support the development of procedural understanding and practical skills. Alkandari (2024) Demonstrates that practical experience, both through hands-on and simulated activities, has an important role in improving students' skills, confidence, and readiness to face real-world situations. In line with this, Cook et al. (2022) Finding that interactive media is able to help learners understand complex procedural systems through clearer visualization and exploration. Kumar et al. (2021) It is also reported that the use of educational games can improve learners' understanding and engagement through interaction, collaboration, and a more enjoyable learning experience. In recent years, the development of immersive technologies such as Virtual Reality (VR) and Augmented Reality (AR) has further expanded the opportunities for the application of digital simulation in education. Recent systematic reviews further indicate that immersive learning environments supported by VR promote deeper cognitive engagement, experiential learning, and procedural skill acquisition across

diverse educational settings (Fernandes et al., 2023; Makransky & Petersen, 2021). Various studies show that VR and AR technology is able to provide a more realistic, interactive, and contextual learning experience so that it can be effectively used to practice procedural and practical skills. In the context of religious education, the use of VR and AR-based digital simulations has begun to be developed to support worship learning and ritual activities that require mastering the exact sequence of actions. These developments show that the integration of project-based learning, gamification, and digital technology has great potential to support the development of digital hajj training that is oriented towards strengthening procedural understanding and practical skills more effectively. This potential is further strengthened by recent evidence demonstrating that technology-enhanced learning environments facilitate active learning, learner autonomy, and authentic learning experiences (Bond et al., 2021).

The development of digital technology has also encouraged the emergence of various innovations in Islamic education, including the use of Virtual Reality (VR) and Augmented Reality (AR) to support procedural and practical learning. Several studies show that VR technology is able to provide a more immersive learning experience in learning manasik Hajj and Umrah, so that students can understand the stages of rituals in a more concrete and contextual way (Asril et al., 2023; Ramadhan et al., 2025). Other research shows that virtual simulations such as V-Tawaf are able to improve students' learning experiences through visualization and direct interaction with the process of implementing tawaf (M Dinein & Kalid, 2022). In addition, studies on the use of AR in Islamic education show that this technology has the potential to increase students' motivation, engagement, and understanding of religious materials that are abstract and procedural (Ajmain et al., 2025; Ruzakki et al., 2024). These results are also supported by international research that shows that Virtual Reality and Augmented Reality are able to improve procedural understanding, immersive learning experiences, and students' readiness to practice skills that require the right sequence of actions (Radianti et al., 2020). The findings show that digital transformation in Islamic education has moved towards more interactive, immersive, and experiential learning.

Although research on Gamified Project-Based Learning, procedural understanding, practice-based learning, and digital learning technologies is evolving, existing studies still show a tendency to address each component separately. Huang et al. (2023) through its systematic study, it shows that the implementation of GPBL is widely applied in the fields of STEM, technology education, and 21st century skill development, with the main focus on increasing student motivation, engagement, and learning outcomes. Meanwhile, Zhang and Watson's research (2025) Emphasizing more emphasis on the role of gamification in increasing the intrinsic and extrinsic motivation of learners through the use of challenges, rewards, and achievement systems in learning. On the other hand, the studies on procedural understanding conducted by Choi et al. (2023), Arnold et al. (2023), Lenz et al. (2024), as well as Keazer and Phaiah (2023) focuses more on the characteristics, development, and relationships between procedural and conceptual knowledge in various learning contexts. Similarly, research on practice-based learning conducted by Alkandari (2024), Cook et al. (2022), Kumar et al. (2021), dan T. Zhang et al. (2021) generally highlighting the effectiveness of practical experiences, simulations, and interactive media in improving learners' skills. Despite making important contributions, these studies have not shown how Gamified Project-Based Learning can function as a pedagogical mechanism that connects procedural understanding with practical skills in an integrated learning framework. Thus, the available literature still shows conceptual fragmentation between studies on gamification, project-based learning, procedural understanding, and practical skills.

In addition, the development of digital technology in education also shows a similar trend. Various studies have reported that interactive digital media, educational games, and simulation technology are able to improve the quality of students' learning experience. However, most of the research still focuses on improving motivation, engagement, or learning outcomes in general, while the relationship between digital technology, procedural understanding, and practical skills has not been comprehensively discussed. In the context of religious education, the use of digital technology to support worship

learning is beginning to develop through the use of virtual simulations and interactive media, but studies that specifically integrate gamification, project-based learning, procedural understanding, and practical skills are still very limited. In fact, the characteristics of worship learning, especially the hajj, have their own complexity because they require mastery of a systematic sequence of procedures as well as the ability to practice each stage of worship correctly. This condition suggests that there is still a need for a conceptual synthesis that is able to explain how modern learning approaches can be used to bridge the mastery of procedures and practical skills in ritual and kinesthetic learning. Therefore, studies that integrate the various research findings are important to produce a more comprehensive understanding of effective learning designs for digital hajj training.

Based on the analysis of the literature, this study identified research gaps that have not received much attention in previous studies. To date, there has been no Systematic Literature Review study that specifically synthesizes the relationship between Gamified Project-Based Learning, procedural understanding, practical skills, and digital learning in one complete conceptual framework. Most previous research places gamification as a strategy to increase learning motivation, project-based learning as a skill development approach, procedural understanding as a cognitive aspect, and digital technology as a stand-alone learning medium. As a result, there is no conceptual model that explains how these four components can be integrated to support learning that requires mastery of procedures as well as practical skills. The novelty of this research lies in the effort to synthesize various findings of previous research to explain the role of Gamified Project-Based Learning as a pedagogical bridge that connects procedural understanding with practical skills through digital learning support. Thus, the main contribution of this research is not only to apply GPBL in the context of digital hajj training, but to build a conceptual synthesis that shows how gamification principles and project-based learning can be used to strengthen the transition process from mastery of procedures to practical skills in ritual, sequential, and kinesthetic learning. This synthesis is expected to be a theoretical basis for the development of DigiHaj media and various Islamic educational technology innovations in the future.

Based on the research gaps that have been identified, this study aims to synthesize and analyze the findings of previous research regarding the implementation of Gamified Project-Based Learning (GPBL), procedural understanding, practical skills, and digital learning in the context of education. In particular, this study seeks to identify the characteristics of GPBL implementation, explain the role of digital learning, gamification, and project-based learning in supporting the development of procedural understanding and practice skills, and uncover research gaps that are still present in the literature. Through the Systematic Literature Review (SLR) approach, this research is expected to produce a conceptual synthesis that explains the relationship between GPBL, procedural understanding, and practical skills as a theoretical foundation for the development of digital hajj training in the future. Thus, the contribution of this research lies not only in mapping the results of previous research, but also in the preparation of a conceptual framework that can be a reference for the development of technology-based learning media, including DigiHaj, to support learning that requires mastery of integrated practice procedures and skills.

To achieve this goal, this research is formulated into three research questions, namely: (1) What are the characteristics of the implementation of Gamified Project-Based Learning (GPBL) in various previous studies in increasing student involvement, motivation, and learning outcomes?; (2) What is the role and influence of digital-based learning approaches, gamification, and project-based learning on the development of procedural understanding and practical skills based on previous research findings?; and (3) What are the research gaps in previous studies related to the integration of GPBL, interactive digital media, and procedural learning that can be the basis for the development of learning innovations in the future?

2. METHODS

This study uses the Systematic Literature Review (SLR) method to identify, evaluate, and synthesize research results related to Gamified Project-Based Learning (GPBL), procedural

understanding, practical skills, and digital learning. The SLR approach was chosen because it allows researchers to obtain a comprehensive picture of the characteristics of GPBL implementation, the effectiveness of gamification-based learning and projects, as well as research trends related to the development of procedural understanding and practical skills. The study implementation process follows the guidelines of Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 which includes the identification, screening, eligibility, and inclusion stages. The use of the PRISMA procedure aims to ensure that the process of searching, selecting, and synthesizing literature is carried out in a systematic, transparent manner, and can be replicated by other researchers.

The research data source is derived from the Scopus database as it provides reputable international publications relevant to the fields of education, learning technology, gamification, and project-based learning. The literature search process was carried out using a combination of keywords compiled based on the focus of the research, namely "Gamified Project-Based Learning", "Procedural Understanding", "Islamic Practice Skills", and "Islamic Education Digital Media". Searches are performed on the article's title, abstract, and keyword fields using Boolean operators to expand the range of search results. The search strings used are: TITLE-ABS-KEY ("Gamified Project-Based Learning" OR "Gamification" OR "Project-Based Learning") AND TITLE-ABS-KEY ("Procedural Understanding" OR "Procedural Knowledge") AND TITLE-ABS-KEY ("Islamic Practice Skills" OR "Practical Skills") AND TITLE-ABS-KEY ("Islamic Education Digital Media" OR "Digital Learning" OR "Educational Technology")

The initial search resulted in 115 articles which were subsequently documented and managed using reference management tools to facilitate the process of data selection and analysis. The inclusion criteria used in this study include: (1) journal articles indexed by Scopus; (2) articles published in the range of 2020–2026; (3) articles that discuss the implementation of GPBL, gamification, project-based learning, procedural understanding, practical skills, or digital learning media; (4) the article is available in full-text form and has an analyzable abstract; and (5) articles written in English. The exclusion criteria include articles that are not relevant to the focus of the research, documents other than journal articles, articles without abstracts, and articles that do not meet the publication quality standards that have been set.

The process of identifying and selecting articles is carried out systematically following the guidelines of PRISMA 2020. To document the process of identification, screening, feasibility assessment, and visualization of the study selection flow diagram, this study utilizes the Watase Uake platform as a tool for the preparation of the PRISMA 2020 diagram. The platform is used to document each stage of article selection so that the literature search process becomes more systematic, transparent, and easily replicated. The selection stage includes article identification through the Scopus database, screening based on inclusion and exclusion criteria, feasibility assessment through abstract and full-text review, and determination of studies that are eligible for further analysis. The overall results of the article selection process are presented in Figure 1.

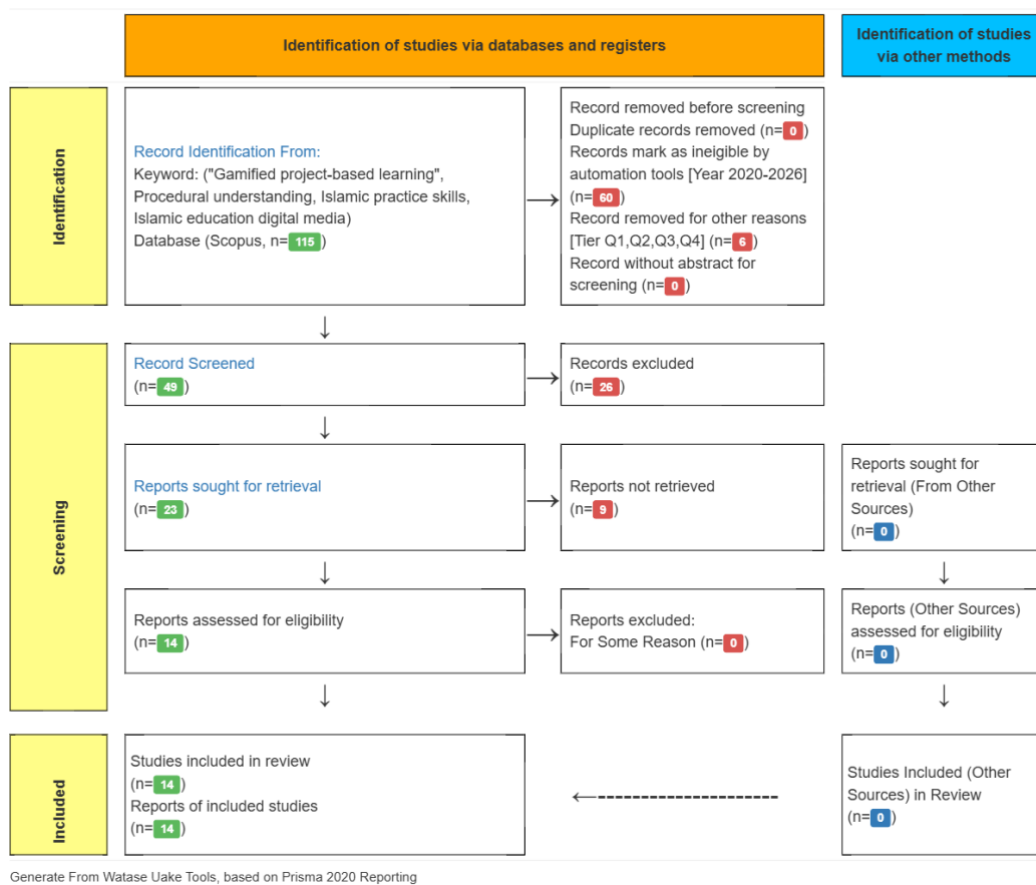


Figure 1. Article Selection Flow Chart Based on PRISMA 2020
 Source: Generated using Watase Uake Tools based on PRISMA 2020

Based on Figure 1, the initial search process resulted in 115 articles obtained from the Scopus database using predefined keywords. In the initial screening stage, 60 articles were eliminated based on the criteria of the year of publication and topic suitability, while the other 6 articles were excluded for not meeting the quality criteria of publication sources. Furthermore, 49 articles entered the screening stage based on titles and abstracts, then 26 articles were eliminated because they were not relevant to the focus of the research. A total of 23 articles entered the complete manuscript search stage, but 9 articles could not be obtained in full so they could not be further analyzed. Thus, 14 articles were obtained that met all eligibility criteria and were designated as primary studies used in the research synthesis process.

Data were analyzed using thematic analysis techniques and narrative synthesis. Each article is extracted based on key information which includes the identity of the publication, research objectives, research methods, GPBL implementation characteristics, use of digital media, procedural understanding aspects, practical skills, and main research findings. The extracted data were then grouped based on the focus of the research questions to identify patterns of findings, research trends, relationships between concepts, and research gaps that are still present in the literature, following a thematic synthesis approach commonly used in systematic literature reviews (Thomas & Harden, 2008; Xiao & Watson, 2019). The results of the synthesis are then used to explain the characteristics of GPBL implementation, the role of digital learning in supporting procedural understanding and practical skills, and to develop a conceptual framework that can be a foundation for the development of technology-based digital hajj training in the future.

3. FINDINGS AND DISCUSSION

3.1. Characteristics and Research Focus of Included Studies

Based on the literature selection process using the PRISMA 2020 guidelines, 14 articles were obtained that met all inclusion criteria and were designated as primary studies in this study. The articles were published in the 2020–2026 period and cover various themes related to Gamified Project-Based Learning (GPBL), procedural understanding, practical skills, practice-based learning, and the use of digital technology in education. The analysis of the characteristics of the study was carried out to identify the research focus, methods used, and the main contribution of each research to the development of studies on gamification-based learning, projects, and procedural skills. A summary of the characteristics of the fourteen articles reviewed is presented in Table 1.

Table 1. Characteristics and Research Focus of Included Studies

| No. | Author | Year | Research Focus | Method | Main Findings |
|-----|---------------------------------|------|-------------------------------------|--------------------------|---|
| 1 | Díaz-Lauzurica & Moreno-Salinas | 2026 | GPBL | Action Research | GPBL improves engagement, collaboration, and problem-solving capabilities |
| 2 | Zhang & Watson | 2025 | Gamification and Motivation | Qualitative Study | Gamification increases intrinsic and extrinsic motivation |
| 3 | Ali et al. | 2025 | Digital Literacy and Islamic Skills | Quantitative | Digital literacy supports the development of practical skills |
| 4 | Lenz et al. | 2024 | Procedural and Conceptual Knowledge | Longitudinal Study | Procedural and conceptual knowledge develop in a complementary way |
| 5 | Alkandari | 2024 | Practice-Based Learning | Qualitative Study | Practical experience improves professional skills |
| 6 | Choi et al. | 2023 | Procedural Understanding | User Study | Procedural understanding is related to mastering steps and methods |
| 7 | Huang et al. | 2023 | Gamified Project-Based Learning | Systematic Review | GPBL improves motivation, learning experience, and learning outcomes |
| 8 | Arnold et al. | 2023 | Procedural Understanding | Educational Data Mining | Procedural understanding becomes the foundation of the inquiry process |
| 9 | Keazer & Phaiah | 2023 | Procedural Fluency | Qualitative Study | Procedural and conceptual understanding is integrated |
| 10 | Stovner & Klette | 2022 | Procedural Skills | Video Study | Learning places a lot of emphasis on procedural skills |
| 11 | Cook et al. | 2022 | Interactive Learning Tools | Design Study | Interactive media makes it easier to understand complex procedures |
| 12 | Kumar et al. | 2021 | Educational Games | Immersive Simulation | Educational games support collaboration and procedural learning |
| 13 | Zhang et al. | 2021 | Procedural Knowledge | Experimental Development | Procedural understanding requires systematic representation |

| | | | | | |
|----|------------------|------|---------------------|--------------------|---|
| 14 | Surian & Margoni | 2020 | Procedural Fairness | Experimental Study | Procedural understanding influences decision-making |
|----|------------------|------|---------------------|--------------------|---|

Table 1 shows that the reviewed research can be grouped into three broad themes. The first theme is research on Gamified Project-Based Learning and gamification which focuses on improving student motivation, engagement, and learning outcomes. The second theme includes research on procedural understanding that examines the characteristics, development, and role of procedural knowledge in supporting the learning process. The third theme consists of research that discusses practical skills, simulations, educational games, and digital media as a means to improve an applicative learning experience. Although each study made a significant contribution, most studies still positioned GPBL, procedural understanding, and practice skills as stand-alone constructs. This condition shows the need for a more comprehensive synthesis to explain the relationships between these components in a single integrated learning framework. These three themes are the basis for the synthesis to answer the research questions that have been formulated.

3.2. Characteristics of Gamified Project-Based Learning Implementation

The results of the synthesis show that the implementation of Gamified Project-Based Learning (GPBL) has relatively consistent characteristics even though it is applied to different learning contexts. Huang et al. (2023) show that GPBL is an integration between project-based learning and gamification elements designed to improve learners' motivation, engagement, and learning outcomes. In the various studies reviewed, the most commonly used gamification elements include points, badges, achievement levels, rewards, challenges, and ongoing feedback. These elements are integrated into project activities so that learners have a more active, challenging, and meaningful learning experience. Díaz-Lauzurica and Moreno-Salinas (2026) found that project activities packaged in the form of challenges are able to increase student participation because each stage of the project has clear goals and indicators of success. Meanwhile, Zhang and Watson (2025) explain that the reward and recognition mechanisms given through gamification contribute to the increase of intrinsic and extrinsic motivation of learners.

The findings are also reinforced by Ali et al. (2025) which are also consistent with the systematic review reported by Oliveira et al. (2023) who show that the integration of gamification into project-based learning activities not only increases learner engagement during the learning process, but also encourages active participation and the achievement of better learning outcomes through structured digital learning experiences.

In addition to the use of game elements, the main characteristic of GPBL lies in authentic and collaborative project activities. The projects given to students are generally oriented towards solving real problems so that they allow for a continuous process of exploration, investigation, and reflection, which is one of the defining characteristics of authentic project-based learning environments (Guo et al., 2020). Through these activities, students not only gain knowledge, but also develop critical thinking, communication, collaboration, and problem-solving skills. The results of the synthesis showed that GPBL consistently increased learning engagement because learners had the opportunity to actively participate in all stages of learning. Thus, the characteristics of GPBL implementation can be summarized into three main components, namely the integration of gamification elements, the implementation of authentic projects, and the active involvement of students. These three components are an important foundation in supporting the learning process that requires gradual mastery of procedures and practical skills. This synthesis is also supported by recent systematic review evidence indicating that project-based learning consistently enhances higher-order thinking, collaboration, learner engagement, and authentic learning experiences across different educational contexts (Kalogiannakis et al., 2021; Oliveira et al., 2023; Uyen et al., 2023).

3.3. The Role of Digital Learning in Developing Procedural Understanding and Practical Skills

The results of the synthesis show that procedural understanding and practical skills are two interrelated components in the learning process. Choi et al. (2023) explain that procedural understanding is related to the ability to understand the sequence of steps, rules, and methods required to complete a task correctly. This conception is consistent with the revised Bloom's Taxonomy, which classifies procedural knowledge as one of the essential knowledge dimensions supporting the application of cognitive processes (Anderson & Krathwohl, 2001). The findings of Arnold et al. (2023), Lenz et al. (2024), and Keazer and Phaiah (2023) show that mastery of procedures not only helps learners know what to do, but also understands the reasons underlying each step taken. Therefore, procedural understanding can be seen as a cognitive foundation that supports the development of practical skills, which aligns with studies applying the revised Bloom's Taxonomy to improve students' procedural capabilities and learning outcomes (Adijaya, 2023). At the same time, Alkandari's research (2024) shows that practical skills develop more optimally when students have the opportunity to apply knowledge through hands-on experience, repetitive exercises, and reflection on the activities carried out.

The development of digital technology provides an increasing opportunity to connect procedural understanding with practical skills. Recent evidence also suggests that immersive learning environments facilitate procedural skill acquisition by combining experiential learning, cognitive engagement, and interactive simulation (Mugisha & Arguel, 2025). This trend is also reflected in recent reviews showing that immersive learning environments facilitate experiential learning and procedural skill acquisition across educational contexts (Maroungkas et al., 2023). Cook et al. (2022) found that interactive media helps learners understand complex procedures through clearer visualizations and simulations, consistent with the principles of multimedia learning that emphasize the integration of visual and verbal information to improve understanding (Mayer, 2024). Kumar et al. (2021) also show that educational games and immersive simulations are able to increase student involvement in learning procedural systems. These findings are strengthened by the research of Ramadhan et al. (2025) who developed Virtual Reality Hajj Journey as a simulation media for Hajj and Umrah that is able to present an immersive learning experience and support the procedural readiness of prospective pilgrims. Similar results were found by Asril et al. (2023) which showed that VR-based learning media on hajj materials were able to improve understanding, realism of learning experiences, and student involvement. In addition, Dinein and Kalid (2022) through the development of V-Tawaf show that VR-based tawaf ritual simulations are able to create a more interactive learning environment than conventional methods. In a broader context, the use of AR in Islamic education has also been shown to increase students' learning motivation, engagement, and understanding of religious concepts that require visualization and direct interaction (Ajmain et al., 2025; Ruzakki et al., 2024).

Furthermore, the results of the synthesis show that the role of gamification and project-based learning not only increases learning motivation, but also serves as a pedagogical mechanism that links procedural understanding with practical skills. Gamification encourages learners to actively engage in learning the sequence of procedures through structured challenges and rewards, while project activities provide opportunities to apply the procedures in an authentic context. When supported by interactive digital media, these three components form a learning environment that allows learners to understand the procedure and practice it gradually. Thus, the integration of GPBL, digital learning, and practical experience can be seen as an effective approach to developing procedural understanding and practical skills simultaneously, supporting authentic and technology-enhanced learning experiences (Bond et al., 2021).

3.4. Research Gaps in Previous Studies

Although various studies have demonstrated the effectiveness of GPBL, procedural understanding, practical skills, and digital learning, the results of the synthesis identified several research gaps that still need attention. First, the implementation of GPBL in previous research is still dominated by the context of STEM, technology education, and general learning. Research examining the application of GPBL to ritual, procedural, and kinesthetic learning is still relatively limited. Second, research on procedural understanding generally focuses on the cognitive aspects and mastery of the steps of a task, while research on practical skills emphasizes more on performative aspects and learning experiences. As a result, the relationship between procedural understanding and practical skills has not been widely described in a single, integrated conceptual framework.

Third, digital technology in various studies is more often positioned as a learning medium that functions to increase access to information, learning motivation, and the quality of material visualization. Nevertheless, there is little research that explains how digital technology can function as a pedagogical mechanism that systematically bridges procedural understanding with practical skills (Makransky & Petersen, 2021). Fourth, most research on gamification is developed in the fields of mathematics, science, technology, and general education, as consistently reported in recent systematic reviews of educational gamification (Subhash & Cudney, 2018). Although these studies show that gamification is effective in increasing motivation and learning engagement, there is still very little research that explains how gamification principles can be applied to ritual, sequential, and kinesthetic learning. As a result, there is still a conceptual gap regarding how gamification mechanisms can be used to link mastery of procedures with practical skills in the context of ritual learning.

Based on these gaps, this study identifies the need for a conceptual framework that integrates Gamified Project-Based Learning, digital learning, procedural understanding, and practical skills in one complete model. This gap is the basis for the development of a conceptual framework for digital hajj training in the next section. Thus, the main contribution of this research lies not only in the synthesis of the literature, but also in the preparation of a conceptual model that explains the relationship between GPBL, procedural understanding, practical skills, and digital learning as the foundation for the development of DigiHaj and future Islamic educational technology innovations.

3.5. Proposed GPBL-Based Digital Hajj Training Framework

Based on the synthesis of fourteen reviewed articles, this study proposes a conceptual framework that integrates Gamified Project-Based Learning (GPBL), digital learning, procedural understanding, and practical skills in the context of digital hajj training. The framework was developed in response to the finding that previous research generally addressed gamification, project-based learning, procedural understanding, and practical skills separately. The results of the synthesis show that gamification plays a role in increasing learners' motivation and engagement, while project-based activities provide an authentic and contextual learning experience. At the same time, procedural understanding is an important foundation for the development of practical skills, while digital technology allows learners to visualize and practice procedures in a more interactive way. Therefore, this study integrates these four components into a single conceptual framework that can be used as a basis for the development of technology-based digital hajj training. The proposed conceptual framework is presented in Figure 2.

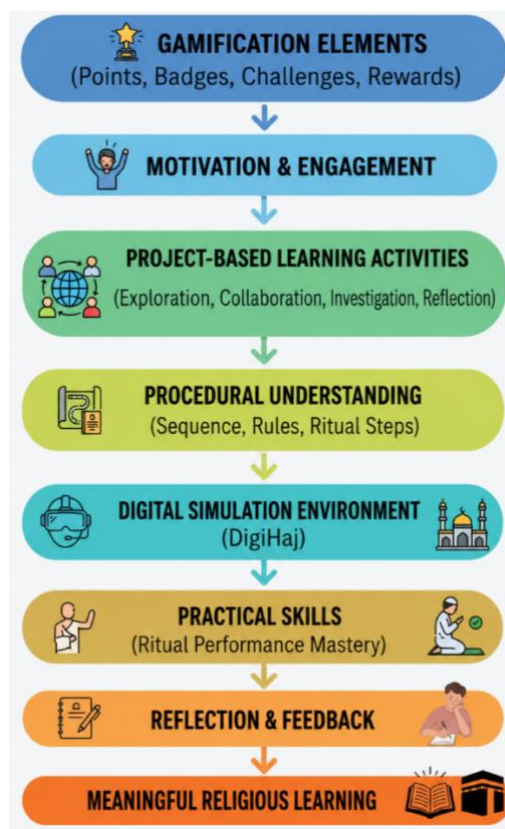


Figure 2. Proposed GPBL-Based Digital Hajj Training Framework
Source: Developed by the authors based on the synthesis of 14 selected studies.

Figure 2 shows that gamification elements function as a trigger for motivation and learning engagement which is further directed into project-based learning activities. Through a structured project, students have the opportunity to understand the sequence of procedures, rules, and stages of implementing an activity in stages. The procedural understanding is then strengthened through a digital simulation environment that allows students to practice and practice repeatedly. This finding is supported by recent studies emphasizing that instructional design grounded in Cognitive Load Theory improves procedural learning in immersive environments (Kala & Ayas, 2023). This process results in the development of more targeted and meaningful practice skills, and is supported by mechanisms of continuous reflection and feedback. Thus, DigiHaj is positioned not only as a medium for delivering information, but as a digital learning environment that integrates motivations, projects, procedures, and practices in one complete learning experience. This framework also shows that ritual learning that is procedural and kinesthetic can be supported through the systematic integration of GPBL and digital technology, thus providing a conceptual basis for the development of Islamic educational technology innovations in the future.

3.6. Theoretical Implications for Islamic Educational Technology

The findings of this study provide theoretical implications for the development of Islamic educational technology, especially in learning that requires mastery of procedures and practical skills. The results of the synthesis show that the development of procedural competencies is not enough to be done through the delivery of information or conceptual explanations alone, but requires a learning experience that allows learners to understand, practice, and reflect on each stage learned. In this context, the integration of Gamified Project-Based Learning (GPBL) offers a new perspective by connecting learning motivations, project activities, procedural understanding, and practical skills in one continuous learning process. These findings broaden the understanding of the role of gamification,

which has been more widely applied to general learning, STEM, and technology education, becoming an approach that is also relevant for ritual, procedural, and kinesthetic learning. Thus, this study provides a theoretical contribution in the form of a synthesis of the relationship between GPBL, procedural understanding, and practical skills that were previously widely studied separately in the literature.

In addition, the resulting conceptual framework provides a new direction for the development of worship simulation applications and Islamic educational technology in the future. Various studies show that the use of Virtual Reality (VR) and Augmented Reality (AR) is able to provide a more authentic, interactive, and immersive learning experience. Ramadhan et al. (2025) shows that Virtual Reality Hajj Journey can be used as a medium for simulation of Hajj and Umrah that supports procedural understanding through realistic learning experiences, while Asril et al. (2023) found that the application of VR in Islamic Religious Education learning was able to increase student engagement and learning experience. Dinein and Kalid (2022) also shows that V-Tawaf as a VR-based simulation of tawaf rituals can support practical learning through more in-depth visualization and interaction. Meanwhile, Ajmain et al. (2025) dan Ruzakki et al. (2024) emphasized that the use of AR and VR in Islamic education has the potential to increase students' motivation, involvement, and understanding of procedural religious materials. The findings are in line with a systematic review by Lampropoulos and Kinshuk (2024) which shows that the integration of Virtual Reality and gamification consistently has a positive impact on student motivation, engagement, and learning outcomes in various educational contexts. However, this study shows that the effectiveness of such technologies is not only determined by the sophistication of the digital features used, but also by the underlying pedagogical design, which should be adapted to learners' characteristics and levels of expertise (Kalyuga, 2007). This argument is also consistent with studies highlighting that instructional design principles have a greater impact on learning effectiveness than technology itself in immersive learning environments (Sulisworo et al., 2024). Therefore, the development of worship learning applications in the future needs to consider the integration of gamification elements, project-based activities, procedural understanding, and practical exercises as a single learning system. In a broader perspective, the proposed conceptual framework can serve as a reference for Islamic educational technology developers in designing digital learning environments that not only increase learning motivation, but also support the mastery of practice procedures and skills more effectively and meaningfully.

4. CONCLUSION

This study aims to synthesize the findings of previous research on Gamified Project-Based Learning (GPBL), digital learning, procedural understanding, and practical skills through a Systematic Literature Review approach to 14 articles that meet the PRISMA selection criteria. The results of the synthesis show that GPBL has the main characteristics in the form of integrating gamification elements with project-based learning activities that are able to increase student motivation, engagement, collaboration, and learning outcomes. In addition, the research findings show that procedural understanding is an important foundation in the development of practical skills, while digital technology plays a role as a means that supports visualization, simulation, and a more interactive learning experience. Thus, the development of effective practical skills requires the integration of learning motivation, authentic activities, procedural understanding, and a digital learning environment that supports the practice process in a sustainable manner.

The study also identified several gaps in the previous literature. Most studies on GPBL still focus on STEM contexts, technology education, and general learning, while research on procedural understanding and practical skills is still largely done separately. In addition, digital technology is generally positioned as a learning medium, rather than as a pedagogical mechanism that connects procedural understanding with practical skills. Based on these findings, this study proposes a conceptual framework that integrates GPBL, digital learning, procedural understanding, and practical skills in the context of digital hajj training. The main contribution of this research lies in the preparation

of a conceptual synthesis that explains the relationship between these components and provides a direction for the development of Islamic educational technology that is more oriented towards learning experience, mastery of procedures, and practical skills.

Further research is suggested to test and validate the proposed conceptual framework through development, experimentation, or implementation research in various religious learning contexts. In addition, the integration of more immersive technologies such as Virtual Reality (VR), Augmented Reality (AR), and artificial intelligence-based digital simulations can be explored to strengthen the effectiveness of learning that demands mastery of procedures and practical skills. Thus, the results of this research are expected to be the basis for the development of digital learning innovations that are more adaptive, interactive, and meaningful in the field of Islamic education.

REFERENCES

- Adijaya. (2023). *International Journal of Educational Methodology Bloom ' s Taxonomy Revision -Oriented Learning Activities to Improve Procedural Capabilities and Learning Outcomes*. 9(1), 261–270.
- Ajmain @ Jima'ain, M. T., Md Hasan, R., & Wan Abdullah, W. A. A. (2025). A Systematic Literature Review (SLR) on the Use of Augmented Reality (AR) Technology in the Teaching and Learning of Islamic Education. *Journal of Research, Innovation, and Strategies for Education (RISE)*, 2(3), 1–14. <https://doi.org/10.70148/rise.v2i3.1>
- Ali, I., Liu, J. N., Shah, S. K., & khattak, M. S. (2025). Islamic Practices and Investment Decision: The Role of Money Management Skills and Digital Financial Literacy. *SAGE Open*, 15(4), 1–23. <https://doi.org/10.1177/21582440251379142>
- Alkandari, K. (2024). Impact of Online Field Practice on Islamic Education Preservice Teachers: Expectations, Learning Loss, and Professional Skill Formation. *International Journal of Distance Education Technologies*, 22(1), 1–17. <https://doi.org/10.4018/IJDET.347215>
- Anderson, L., & Krathwohl, D. (2001). A Revision of Bloom ' s Taxonomy : An Overview David R . Krathwohl. *ReVision*, 41(4), 212–218. <https://doi.org/10.1207/s15430421tip4104>
- Arnold, J. C., Mühlhng, A., & Kremer, K. (2023). Exploring core ideas of procedural understanding in scientific inquiry using educational data mining. *Research in Science and Technological Education*, 41(1), 372–392. <https://doi.org/10.1080/02635143.2021.1909552>
- Asril, Z., Syafril, S., Engkizar, & Arifin, Z. (2023). Advancing Educational Practices: Implementation and Impact of Virtual Reality in Islamic Religious Education. *Jurnal Pendidikan Islam*, 9(2), 199–210. <https://doi.org/10.15575/jpi.v9i2.20567>
- Bai, S., Hew, K. F., & Huang, B. (2020). Does gamification improve student learning outcome? Evidence from a meta-analysis and synthesis of qualitative data in educational contexts. *Educational Research Review*, 30(June 2019), 100322. <https://doi.org/10.1016/j.edurev.2020.100322>
- Bond, M., Bedenlier, S., Marín, V. I., & Händel, M. (2021). Emergency remote teaching in higher education: mapping the first global online semester. *International Journal of Educational Technology in Higher Education*, 18(1). <https://doi.org/10.1186/s41239-021-00282-x>
- Choi, B., Casteel, S., Arguello, J., & Capra, R. (2023). Better Understanding Procedural Search Tasks: Perceptions, Behaviors, and Challenges. *ACM Transactions on Information Systems*, 42(3). <https://doi.org/10.1145/3630004>
- Cook, M., Gow, J., Smith, G., & Colton, S. (2022). Danesh: Interactive Tools for Understanding Procedural Content Generators. *IEEE Transactions on Games*, 14(3), 329–338. <https://doi.org/10.1109/TG.2021.3078323>
- Díaz-Lauzurica, B., & Moreno-Salinas, D. (2026). Gamified Project-Based Learning in Vocational Education and Training Computer Science Courses. *Computers*, 15(2), 1–44. <https://doi.org/10.3390/computers15020082>
- Dichev, C., & Dicheva, D. (2017). Gamifying education: what is known, what is believed and what remains uncertain: a critical review. In *International Journal of Educational Technology in Higher Education* (Vol. 14). International Journal of Educational Technology in Higher Education.

- <https://doi.org/10.1186/s41239-017-0042-5>
- Fernandes, F. A., Rodrigues, C. S. C., Teixeira, E. N., & Werner, C. M. L. (2023). Immersive Learning Frameworks: A Systematic Literature Review. *IEEE Transactions on Learning Technologies*, 16(5), 736–747. <https://doi.org/10.1109/TLT.2023.3242553>
- Guo, P., Saab, N., Post, L. S., & Admiraal, W. (2020). A review of project-based learning in higher education: Student outcomes and measures. *International Journal of Educational Research*, 102(November 2019), 101586. <https://doi.org/10.1016/j.ijer.2020.101586>
- Huang, W., Li, X., & Shang, J. (2023). Gamified Project-Based Learning: A Systematic Review of the Research Landscape. *Sustainability*, 15(2), 940. <https://doi.org/10.3390/su15020940>
- Hurrell, D. (2021). Conceptual Knowledge OR Procedural Knowledge or Conceptual Knowledge AND Procedural Knowledge: Why the Conjunction is Important to Teachers. *Australian Journal of Teacher Education*, 46(2), 57–71. <https://doi.org/10.14221/ajte.2021v46n2.4>
- Kala, N., & Ayas, A. (2023). Effect of instructional design based on cognitive load theory on students' performances and the indicators of element interactivity. *Journal of Turkish Science Education*, 20(3), 468–489. <https://doi.org/10.36681/tused.2023.027>
- Kalogiannakis, M., Papadakis, S., & Zourmpakis, A. I. (2021). Gamification in science education. A systematic review of the literature. *Education Sciences*, 11(1), 1–36. <https://doi.org/10.3390/educsci11010022>
- Kalyuga, S. (2007). Expertise reversal effect and its implications for learner-tailored instruction. *Educational Psychology Review*, 19(4), 509–539. <https://doi.org/10.1007/s10648-007-9054-3>
- Keazer, L., & Phaiyah, J. (2023). Analyzing Prospective Elementary Teachers' Evidence of Conceptual Understanding and Procedural Fluency. *Investigations in Mathematics Learning*, 15(2), 135–148. <https://doi.org/10.1080/19477503.2022.2139112>
- Kumar, V., Tissenbaum, M. B., & Kim, T. (2021). Procedural Collaboration in Educational Games: Supporting Complex System Understandings in Immersive Whole Class Simulations. *Communication Studies*, 72(6), 994–1016. <https://doi.org/10.1080/10510974.2021.2011363>
- Lampropoulos, G., & Kinshuk. (2024). Virtual reality and gamification in education: a systematic review. In *Educational Technology Research and Development* (Vol. 72). Springer US. <https://doi.org/10.1007/s11423-024-10351-3>
- Lenz, K., Reinhold, F., & Wittmann, G. (2024). Transitions between conceptual and procedural knowledge profiles. Patterns in understanding fractions and indicators for individual differences. *Learning and Individual Differences*, 116(August). <https://doi.org/10.1016/j.lindif.2024.102548>
- M Dinein, M. S., & Kalid, K. S. (2022). V-Tawaf: A Virtual Reality Application for the Learning of the Tawaf Ritual. *7th International Conference on Information Technology & Society*, 7(2), 29–38. Retrieved from <https://myjict.uis.edu.my/index.php/journal/article/view/154%0Ahttps://myjict.uis.edu.my/index.php/journal/article/download/154/103>
- Makransky, G., & Petersen, G. B. (2021). The Cognitive Affective Model of Immersive Learning (CAMIL): a Theoretical Research-Based Model of Learning in Immersive Virtual Reality. *Educational Psychology Review*, 33(3), 937–958. <https://doi.org/10.1007/s10648-020-09586-2>
- Marougkas, A., Troussas, C., Krouska, A., & Sgouropoulou, C. (2023). Virtual Reality in Education: A Review of Learning Theories, Approaches and Methodologies for the Last Decade. *Electronics (Switzerland)*, 12(13). <https://doi.org/10.3390/electronics12132832>
- Mayer, R. E. (2024). The Past, Present, and Future of the Cognitive Theory of Multimedia Learning. *Educational Psychology Review*, 36(1), 1–25. <https://doi.org/10.1007/s10648-023-09842-1>
- Mugisha, G., & Arguel, A. (2025). Procedural Learning in Mixed Reality: Assessing Cognitive Load and Performance. *Education Sciences*, 15(3), 1–22. <https://doi.org/10.3390/educsci15030339>
- Oliveira, W., Hamari, J., Shi, L., Toda, A. M., Rodrigues, L., Palomino, P. T., & Isotani, S. (2023). Tailored gamification in education: A literature review and future agenda. In *Education and Information Technologies* (Vol. 28). Springer US. <https://doi.org/10.1007/s10639-022-11122-4>

- Radianti, J., Majchrzak, T. A., Fromm, J., & Wohlgenannt, I. (2020). A systematic review of immersive virtual reality applications for higher education: Design elements, lessons learned, and research agenda. *Computers and Education*, 147(November 2019), 103778. <https://doi.org/10.1016/j.compedu.2019.103778>
- Ramadhan, M. R., Mutiara Hasanah, S., Khoirunnisa, T., Medhi Sampurno, T. A., Faizin, N., Sultoni, A., ... Bin Rekan, A. A. (2025). Building Virtual Reality Hajj Journey Learning Media as a Simulation Tool for Teaching Hajj and Umrah Topics. *Nadwa: Jurnal Pendidikan Islam*, 19(1), 39–64. <https://doi.org/10.21580/nw.2025.19.1.26704>
- Ruzakki, H., Nashrullah, N., Junaedi, D., Khoiriyah, S., & Asror, M. (2024). Trend Pemanfaatan Teknologi Augmented Reality Dan Virtual Reality Dalam Pembelajaran Pendidikan Agama Islam Di Indonesia. *Edukasi Islami: Jurnal Pendidikan Islam*, 13(01), 97–108. <https://doi.org/10.30868/ei.v13i01.4888>
- Sailer, M., & Homner, L. (2020). The Gamification of Learning: a Meta-analysis. *Educational Psychology Review*, 32(1), 77–112. <https://doi.org/10.1007/s10648-019-09498-w>
- Stovner, R. B., & Klette, K. (2022). Teacher feedback on procedural skills, conceptual understanding, and mathematical practices: A video study in lower secondary mathematics classrooms. *Teaching and Teacher Education*, 110, 103593. <https://doi.org/10.1016/j.tate.2021.103593>
- Subhash, S., & Cudney, E. A. (2018). Gamified learning in higher education: A systematic review of the literature. *Computers in Human Behavior*, 87, 192–206. <https://doi.org/10.1016/j.chb.2018.05.028>
- Sulisworo, D., Erviana, V. Y., & Robiin, B. (2024). Application of Cognitive Load Theory in VR Development and Its Impact on Learning: A Perspective on Prior Knowledge, Learning Interest, Engagement, and Content Comprehension. *International Journal on Informatics Visualization*, 8(2), 874–881. <https://doi.org/10.62527/joiv.8.2.2467>
- Surian, L., & Margoni, F. (2020). First steps toward an understanding of procedural fairness. *Developmental Science*, 23(5), 1–12. <https://doi.org/10.1111/desc.12939>
- Thomas, J., & Harden, A. (2008). Methods for the thematic synthesis of qualitative research in systematic reviews. *BMC Medical Research Methodology*, 8, 1–10. <https://doi.org/10.1186/1471-2288-8-45>
- Uyen, B. P., Tong, D. H., & Ngan, L. K. (2023). Online project-based learning for teacher education during the COVID-19 pandemic: A systematic review. *Contemporary Educational Technology*, 15(3). <https://doi.org/10.30935/cedtech/13238>
- Xiao, Y., & Watson, M. (2019). Guidance on Conducting a Systematic Literature Review. *Journal of Planning Education and Research*, 39(1), 93–112. <https://doi.org/10.1177/0739456X17723971>
- Zainuddin, Z., Chu, S. K. W., Shujahat, M., & Perera, C. J. (2020). The impact of gamification on learning and instruction: A systematic review of empirical evidence. *Educational Research Review*, 30(February). <https://doi.org/10.1016/j.edurev.2020.100326>
- Zhang, T., Zeng, Y., Pan, R., Shi, M., & Lu, E. (2021). Brain-Inspired Active Learning Architecture for Procedural Knowledge Understanding Based on Human-Robot Interaction. *Cognitive Computation*, 13(2), 381–393. <https://doi.org/10.1007/s12559-020-09753-1>
- Zhang, Y., & Watson, S. L. (2025). Impacts of Gamified Project-Based Learning on Students' Achievement Motivation in Rural China. *TechTrends*, 69(3), 471–484. <https://doi.org/10.1007/s11528-025-01051-7>

