

Implementation of the GDLC Method in Developing RPG Educational Games to Improve Student Learning Outcomes in the Introduction of the 25 Prophets

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Article Information	ABSTRACT
Article History Received : April 12, 2026 Revised : April 19, 2026 Published : April 24, 2026	Learning media innovation is rapidly evolving alongside digital technology, particularly through the use of educational games. This study aims to develop and evaluate an interactive RPG-based educational game to introduce the 25 Prophets to primary school students. The research employs the Game Development Life Cycle (GDLC) method, which systematically covers six phases: initiation, pre-production, production, testing, beta, and release. During these stages, the game was designed to integrate short stories, educational resources, and comprehension tests into an immersive RPG environment. The application was tested with students at SDN 3 Jati to measure its effectiveness. The results indicate a significant improvement in student learning outcomes; the average pre-test score of 55% rose to 85% in the post-test, reflecting a 30% increase in comprehension. Furthermore, user satisfaction surveys rated the application's usability and interface design as "Excellent." Consequently, this educational game serves as an innovative and effective alternative medium, providing a dynamic approach to religious education and character building in the digital age.
Keywords: <i>Educational Games; learning Media; 25 Prophets; Islamic Religious Education; Interactive Applications.</i>	

INTRODUCTION

Religious education for primary school children serves as a fundamental pillar in shaping character and moral integrity from an early age. Within the Islamic educational curriculum, the history of the 25 Prophets holds a central position as it provides exemplary life lessons and ethical guidance (Hidayat et al., n.d.). However, the delivery of this material in many primary schools often relies on conventional pedagogical methods, such as rote memorization and passive reading of textbooks. These traditional approaches frequently lead to a lack of engagement and low retention rates among students, particularly those in the "Alpha Generation" who are inherently accustomed to interactive and digital-based stimuli (Istiqomah Rahmawati et al., 2021). The gap between traditional teaching methods and the cognitive preferences of modern students necessitates a technological intervention that can transform abstract historical narratives into immersive learning experiences (Dodevska et al., n.d.).

The rapid advancement of information technology has paved the way for serious games as effective educational tools. Unlike entertainment-focused software, educational games combine instructional content with gameplay mechanics to foster "learning by doing" (Li et al., 2024). Role-Playing Games (RPG) are particularly suited for historical storytelling because they allow players to inhabit a character, explore environments, and make decisions that reflect the narrative's context (Faza Akhnaf et al., n.d.). In an RPG setting, the stories of the 25 Prophets can be visualized through quests and dialogues, making the learning process more empathetic and experiential.

Previous research has shown that game-based learning can significantly increase student motivation and improve the mastery of complex subjects by providing immediate feedback and a sense of progression (Islam et al., 2024).

Several studies have explored the use of multimedia for religious education. For instance, research on mobile-based Islamic history applications has demonstrated that visual aids help children visualize ancient civilizations and prophetic miracles (Olamilekan Sanusi & Mizan Sya'roni, 2025). However, many existing applications are linear and lack the interactive depth found in RPGs. Furthermore, the development of such software requires a structured framework to ensure that both the technical and educational objectives are met (Asadzadeh et al., 2024). The Game Development Life Cycle (GDLC) is a specialized methodology designed to manage the complexities of game creation. By utilizing GDLC, developers can ensure that the game's mechanics, narrative, and educational milestones are integrated seamlessly. This systematic framework allows for rigorous version control and technical optimization, minimizing bugs and maximizing user engagement through iterative testing (Febriyanto et al., 2024).

Despite the potential of RPGs, there is a scarcity of specialized games focusing specifically on the comprehensive history of the 25 Prophets designed for primary school students using a rigorous engineering approach like GDLC. Most available games are either too simplistic or lack the technological robustness required for a classroom environment (Arosquipa Lopez et al., 2023). This research addresses this gap by developing an interactive RPG-based media for introducing the 25 Prophets. This application is not merely a digital book but a dynamic world where students can interact with the history they are studying (Ilham Abdillah et al., n.d.). The use of applied technology in this context aims to bridge the gap between spiritual education and modern digital literacy, providing a prototype that can be adopted by formal and informal educational institutions (Jamil et al., 2025).

Despite the extensive body of research on digital learning media, a significant research gap persists in current literature. Most existing instructional tools for prophetic history remain linear and static, failing to leverage the exploratory potential of the RPG genre. Furthermore, there is a scarcity of developers who rigorously apply the Game Development Life Cycle (GDLC) framework to the creation of religious content, often resulting in end products that are suboptimal both technically and pedagogically. This study aims to address this void by integrating a systematic software development methodology with complex prophetic narratives to create a learning medium that is not only technically sound but also educationally effective.

The primary problem addressed in this study is the declining interest of primary school students in conventional religious history lessons and the need for a standardized development process for educational games (Nasiruddin et al., 2025). By applying the GDLC method, this research ensures that the resulting software is technically sound and pedagogically effective. The expected benefits of this research include providing a more attractive learning alternative for students, offering a teaching aid for educators that aligns with 21st-century skills, and contributing to the field of applied technology by demonstrating a structured development workflow for religious educational software (Fadhil et al., 2024). This study also aims to provide a benchmark for future developers in creating high-quality, culturally sensitive, and educational gaming content. Ultimately, the main aim of this research is to design and implement an interactive RPG-based media for the introduction of the 25 Prophets for primary school students using the Game Development Life Cycle (GDLC) method to enhance student engagement and learning outcomes (Muhammad Asrul Sultan et al., 2025).

RESEARCH METHODS

This research uses a systematic software engineering approach to ensure that the resulting interactive media meets applied technology standards and pedagogical needs. The main framework applied is the Game Development Life Cycle (GDLC) method which consists of six critical stages, namely initiation, pre-production, production, testing, beta, and release (Ramadaniati et al., 2025). The choice of the GDLC method is considered very important because of the iterative nature of game development, where each stage allows for feedback evaluation to ensure the quality of game mechanics and the accuracy of the historical content of

the 25 Prophets. This research design focuses on product development (Research and Development) that combines RPG narrative elements with the Islamic religious education curriculum for elementary school level (Muhammad Asrul Sultan et al., 2025).

To provide a rigorous scientific evaluation, the data analysis in this study is divided into two primary categories:

Descriptive Statistical Analysis for Media Validation and Usability. Data obtained from Likert-scale questionnaires (Expert Validation and User Satisfaction) are analyzed using the percentage formula to determine the feasibility level of the media:

$$P = \frac{\sum X}{\sum X_{max}} \times 100 \quad (1)$$

Where:

- P : Final percentage of feasibility.
- $\sum X$: Total score obtained from respondents.
- $\sum X_{max}$: Maximum possible score.

The resulting percentage is then categorized based on the following criteria: 81-100% (Very Feasible), 61-80% (Feasible), 41-60% (Moderately Feasible), and <40% (Not Feasible).

Analysis of Learning Outcomes (Effectiveness). To measure the improvement in student understanding before and after using the RPG media, the Normalized Gain (N-Gain) Score is calculated. This formula ensures that the increase in knowledge is measured objectively:

$$g = \frac{T_{post} - T_{pre}}{T_{max} - T_{pre}} \quad (2)$$

Where:

- g : N-Gain score.
- T_{post} : Post-test score.
- T_{pre} : Pre-test score.
- T_{max} : Maximum ideal score.

The effectiveness is categorized into high ($g > 0.7$), medium ($0.3 \leq g \leq 0.7$), or low ($g < 0.3$). Additionally, descriptive statistics including the Mean (average), Median, and Standard Deviation are utilized to describe the distribution of student scores, ensuring that the development is a measurable scientific process to address the problem of low engagement in religious history education.

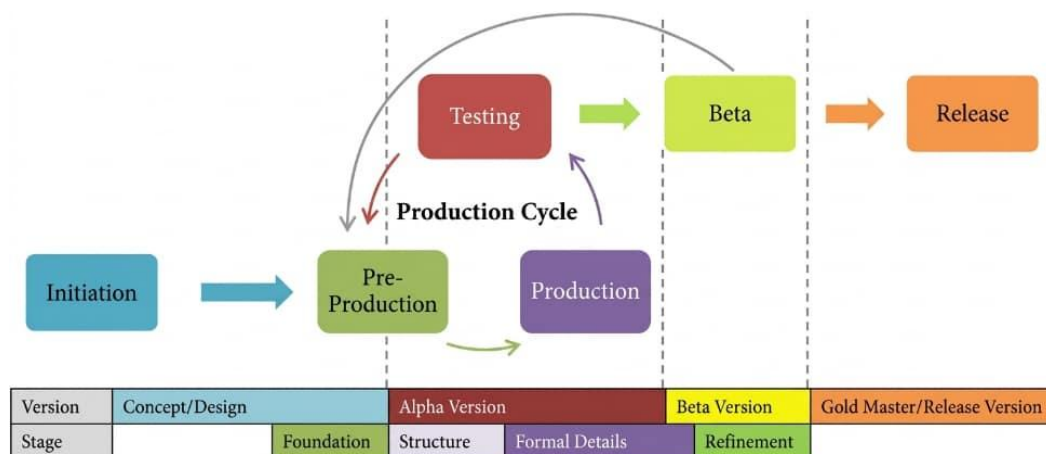


Figure 1. GDLC Method

The GDLC framework illustrated in Figure 1 represents an iterative and structured workflow specifically designed for game engineering, beginning with the Initiation phase where the core concept, educational objectives for the 25 Prophets, and RPG genre constraints are defined. This is followed by Pre-production, involving architectural planning such as storyboard creation and game mechanics design to ensure narrative alignment with Islamic history, which then leads into the Production phase where assets are integrated through coding and game engine development. During the Testing and Beta stages, the software undergoes internal evaluations for logic errors and limited release to students for usability feedback, respectively; finally, the Release phase marks the polished deployment of the application, while the iterative nature of the cycle—indicated by the arrows in the diagram—ensures that any technical or pedagogical gaps discovered can be refined by reverting to earlier stages.

Population in this study includes all elementary school students in 11 to 12 years. Sample selection was carried out using a purposive sampling technique, where research subjects were selected based on certain criteria, namely upper grade students who already have basic digital literacy and are currently studying the history of the Prophet in the school curriculum. The number of samples involved in the limited testing phase was 30 students to obtain representative data regarding aspects of usability and learning effectiveness. In addition to student subjects, this study also involved religious material experts and media experts as validators to ensure that the historical content presented was theologically and technically valid.

And the research work procedure began with an initiation phase to determine the basic concept, target users, and genre of the RPG to be developed (Hana Saputri, 2021). In the pre-production phase, storyboards were designed, character designs for the 25 prophets were designed in a non-physical visual form (focusing on narrative and symbolism), and game algorithms were developed. The production phase involved coding using a game engine and the integration of multimedia assets such as audio, environmental visual assets, and user interfaces. During this process, parameters observed included the functionality of the game's features, the level of student engagement when interacting with the media, and the improvement of students' cognitive understanding of the order and miracles of the prophets. Observations were conducted in a participatory manner to see how RPG mechanics could spark students' curiosity about the embedded educational content (Saputri & Putra, 2023).

Technical of analysis in this study was conducted through two main approaches. First, software quality analysis was conducted using black-box testing to ensure the entire game logic ran without technical errors. Second, learning effectiveness analysis was measured using a Likert-scale questionnaire and learning outcome tests (pre-test and post-test). The collected data were then processed using descriptive statistics to determine the percentage of media suitability and the significance of improvements in student understanding. All of these methods were designed to provide a clear picture that interactive media development is not simply a programming activity, but rather a measurable scientific process to address the problem of low interest in learning religious history through the integration of appropriate game technology (Okra, 2023).

RESULTS AND DISCUSSION

The primary objective of this system design is to structure a program that ensures seamless data flow, thereby facilitating a clearer understanding for developers throughout the creation process. This study utilizes Unified Modeling Language (UML) diagrams—specifically Use Case, Activity, and Sequence Diagrams—to represent the operational logic of the RPG, following previous research that demonstrated successful outcomes (Aurellia, 2025). The following sections outline the proposed system design: Significant information about the technical functionality and pedagogical impact of the RPG-based educational game "Pengenal 25 Nabi" was obtained from its implementation at SDN 3 Jati. Black-box testing was used to confirm the software's quality and ensure that all

essential features, such as the interactive quizzes, prophet biographies, and narrative missions, worked flawlessly on Android-based smartphones.

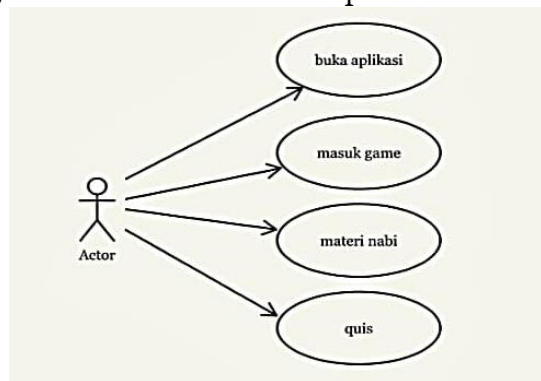


Figure 2. Use Case Diagram

This diagram illustrates the interaction scenarios between the actor and the primary use cases, encompassing the complete sequence of events from initiation to conclusion.

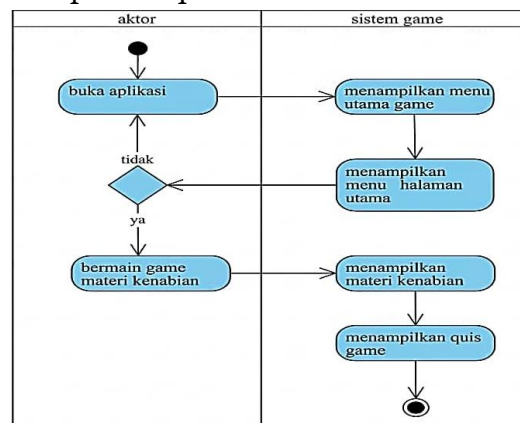


Figure 3. Activity Diagram

An Activity Diagram serves as a visual representation of the workflow or operational processes executed within the system. As depicted in the figure, a single user initiates the process by launching the application. The system responds by displaying the landing page. Subsequently, the user selects the "Start Application" option, and the system proceeds to display the requested interface.

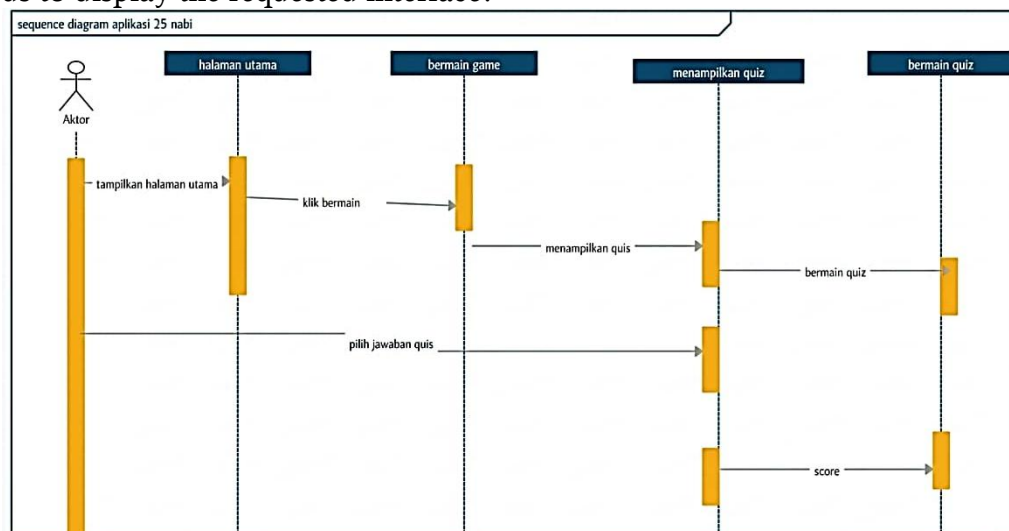


Figure 4. Sequence Diagram

Based on the illustrated Sequence Diagram, the user is initially directed to the Main Menu upon launching the application. This interface features "Start" and "Instructions" menus. When the user selects the "Play" menu, the system navigates to a secondary menu page containing three primary options: Content, Quiz, and Game.

The final stage of this application design involves the development of the 'Introduction to the 25 Prophets' game, which is detailed as follows:

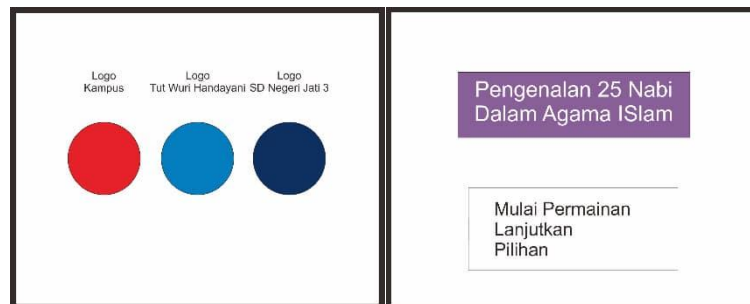


Figure 5. Initial Design of the Game and Menu

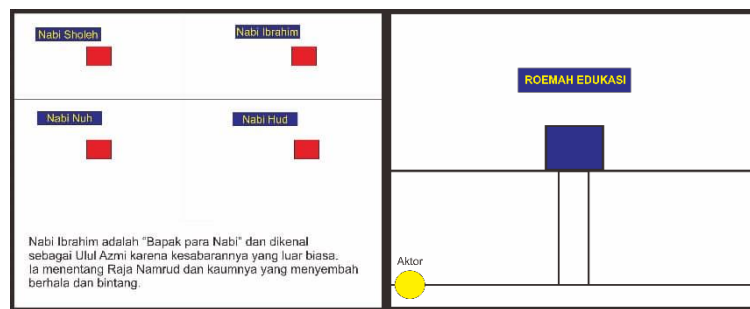


Figure 6. Design of the Prophet Introduction and Educational Room Options



Figure 7. Design of the Quiz and Prophet Muhammad's Story Room



Figure 8. Design of Prophet Muhammad's Story and the Final Quiz

Subsequently, the application was developed using RPG Maker MV and converted for the Android platform. The resulting game application is presented as follows:

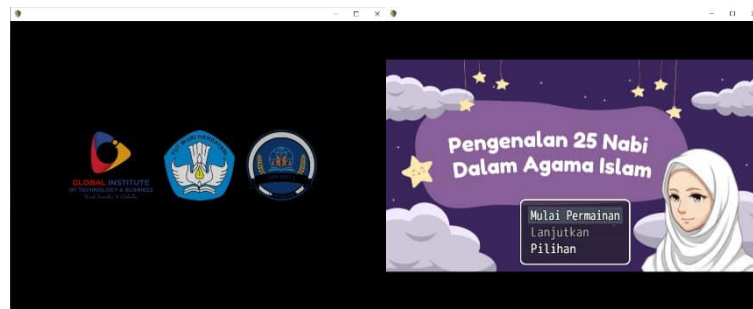


Figure 9. Game and Menu Interface Display



Figure 10. Prophet Introduction and Educational Room Selection Display



Figure 11. Quiz and Prophet Muhammad's Story Room Display



Figure 12. Prophet Muhammad's Story and Final Quiz Display

To facilitate the development of this educational media application, a storyboard is employed as a design guideline. The storyboard integrates narrative elements with visual components within a single framework, ensuring consistency between text and graphics. It serves as a vital storytelling and planning tool, providing a conceptual blueprint prior to the actual development of the application objects.

Examination of Learning Results

Measuring how well the game improved cognitive mastery was the main goal. The pre-test and post-test results showed a significant improvement in students' comprehension. The average score increased from 55% to 85%, indicating a notable

improvement in material retention. This enhancement shows how RPG mechanics' "learning by doing" method successfully closes the gap between students' understanding and abstract historical narratives.



Figure 13. Improvement in Students' Cognitive Learning Outcomes

Motivation of Students and Teacher Reaction

The study examined stakeholder participation and positive response in addition to cognitive gains. Ninety percent of Islamic Religious Education (PAI) teachers agreed that the game made difficult historical narratives easier to understand, according to the Likert-scale questionnaire. Additionally, compared to traditional rote memory, 85% of pupils said they were more motivated. These findings support the Cognitive Theory of Multimedia Learning, which holds that information processing is improved when verbal and visual signals are combined (Mayer, 2009). "Pengenalan 25 Nabi" encouraged a sense of accomplishment that is frequently lacking in conventional textbooks thanks to its interactive incentives and challenge-based growth.

Comparative Analysis and Restrictions

In previous research, The application of the GDLC model successfully produced a high-quality educational game tailored to the needs of Dyslexic children, as evidenced by Black Box Testing results which confirmed that all functional features operated correctly (Oktaviani et al., 2025).

The results of this study corroborate other research suggesting that religious teaching can become an immersive experience through serious gaming. This study does, however, admit many limitations, including the limited sample size at SDN 3 Jati and the short intervention period. Adaptive difficulty levels should be the main emphasis of future development in order to accommodate students' varying learning paces.

Tabel 1. Table of Indicators

Functional	Usability	UI/UX Interfaces	Learning Outcomes
Suitability of features to user requirement	Navigation Mode	Design Attractiveness and Consistency	Improvement of learning outcomes (quizzes)
Fuctioning of error/bug	Clarity of menus and buttons	Color/font selection and graphic qualities	Ability to understand concepts

Application stability and endurance	Easy learning for new users	Satisfaction and user engagement	User's memory of content
Functional	Usability	UI/UX Interfaces	Learning Outcomes
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Results of the application's testing on a **Table.2** out of 26 respondents indicate a very high level of success with the validation category "Great" across all penilaian indicators. The UI/UX Interface aspect has a score of 90 on the sub-indicators of design and consistency, which is in line with the increase in students' ability to understand the material on the Learning of Outcomes indicator, which also reaches a score of 90. In addition, the technical performance in the functional and usability aspects demonstrates stability and solid navigation with a rentang score of 84 to 88, indicating that the application "Pengenalan 25 Nabi" is not only visually appealing but also highly effective and ergonomic as an innovative learning tool for students in the Dasar school.

Tabel 2. Feedback of Responding

Indicators	Sub-Indicators	Responder	Score (adv)	Validation
Functional 1	Suitability of features to user requirement	26 users	88	Great
Functional 2	Fuctioning of error/bug	26 users	85	Great
Functional 3	Application stability and endurance	26 users	84	Great
Usability 1	Navigation Mode	26 users	84	Great
Usability 2	Clarity of menus and buttons	26 users	88	Great
Usability 3	Easy learning for new user	26 users	88	Great
UI/UX Interface 1	Design Attractiveness and Consistency	26 users	90	Great
UI/UX Interface 2	Color/font selection and graphic qualities	26 users	86	Great
UI/UX Interface 3	Satisfaction and user engagement	26 users	88	Great
Learning of Outcomes 1	Improvement of learning outcomes (quizzes)	26 users	86	Great
Learning of Outcomes 2	Ability to understand concepts	26 users	90	Great
Learning of Outcomes 3	User's memory of content	26 users	84	Great

CONCLUSION

The study concludes that the RPG educational game "Pengenalan 25 Nabi" serves as a robust and effective interactive medium for religious instruction at the elementary school level. By

implementing the GDLC framework, the integration of narrative quests and gameplay dynamics successfully bridges the gap between traditional pedagogical approaches and the digital learning preferences of the Alpha Generation, as evidenced by a significant increase in cognitive mastery from 55% to 85%. These findings demonstrate that immersive game-based learning can transform abstract historical narratives into experiential environments that not only improve information retention but also effectively internalize moral values such as patience and honesty.

Based on these results, it is practically recommended that Islamic Religious Education (PAI) instructors integrate interactive RPGs as a supplemental tool to enhance engagement and mitigate boredom in history-heavy subjects. For future research, it is advised to utilize a larger, multi-regional sample size to validate the scalability of these findings and to explore the "Experiential Religious Learning" model further. Additionally, investigating the incorporation of multiplayer functionalities is suggested to observe how cooperative digital gaming influences students' social and spiritual behaviors within a collective learning environment.

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REFERENCES

- Arosquipa Lopez, J. Y., Nuñoncca Huaycho, R. N., Yallercco Santos, F. I., Mendoza, F. T., & Rucano Paucar, F. H. (2023). The Impact of Serious Games on Learning in Primary Education: A Systematic Literature Review. *International Journal of Learning, Teaching and Educational Research*, 22(3), 379–395. <https://doi.org/10.26803/ijlter.22.3.23>
- Asadzadeh, A., Shahrokhi, H., Shalchi, B., Khamnian, Z., & Rezaei-Hachesu, P. (2024). Serious educational games for children: A comprehensive framework. *Heliyon*, 10(6). <https://doi.org/10.1016/j.heliyon.2024.e28108>
- Aurellia, A. (2025). PEMANFAATAN UML DALAM PERANCANGAN SISTEM INFORMASI PRODUK KREATIF DAUR ULANG SAMPAH BERBASIS WEB. *Jurnal Informatika Dan Teknik Elektro Terapan*, 13(3S1). <https://doi.org/10.23960/jitet.v13i3S1.8073>
- Dodevska, M., Atanaskoski, Z., Jovanov, M., Stankov, E., & Lameski, P. (n.d.). *Exploring the Educational Potential of Virtual Reality and Mixed Reality: Immersive Learning, Student Engagement, and Knowledge Retention*.
- Fadhil, M., Damayanti, F., & Penulis, K. (2024). Penerapan Metode Game Development Life Cycle pada Game Edukasi Pengenalan Sejarah Suku Kluet. *BRIDGE*, (2), 194–205. <https://doi.org/10.62951/bridge.v2i2.427>
- Faza Akhnaf, A., Kusuma Ayu, W., & Pratama Nugraha, E. A. (n.d.). IMPLEMENTATION OF EDUCATIONAL GAMES BASED ON ROLE PLAYING GAMES (RPG) AS A LEARNING MEDIA FOR CHARACTER EDUCATION. 8(1). <https://doi.org/10.21776/ub.waskita.2024.008.01.1>
- Febriyanto, F., Sari, R. P., & Rahmayuda, S. (2024). IMPLEMENTASI METODE GAME DEVELOPMENT LIFE CYCLE (GDLC) PADA PERANCANGAN GAME EDUKASI PRA KEMERDEKAAN KALIMANTAN BARAT. *Jurnal Teknologi Informasi*, 5(3). <https://doi.org/10.46576/djtechno>

- Hana Saputri, F. (2021). Journal of Sisfotek Global Development of Media for Introduction and Prevention of Covid-19 Based on Role Playing Game for Elementary School ARTICLE HISTORY. *Issn*, 11(2), 108–114. <http://journal.stmikglobal.ac.id/index.php/sisfotek>
- Hidayat, N., Wibowo, Y. R., & Salfadilah, F. (n.d.). *PERAN GURU PENDIDIKAN AGAMA ISLAM DALAM MEMBENTUK KARAKTER RELIGIUS SISWA SEKOLAH DASAR*.
- Ilham Abdillah, M., Luqna Hunaida, W., & Muqit, A. (n.d.). Digitalization of Islamic Education Learning through Interactive Educational Games. *Edudeena : Journal of Islamic Religious Education*, 9(1), 67–76. <https://doi.org/10.30762/edudeena.v9i1.4230>
- Islam, K. R., Komalasari, K., Masyitoh, I. S., Juwita, J., & Adnin, I. (2024). Pengaruh Model Pembelajaran Game Based Learning terhadap Motivasi Belajar Peserta Didik. *Ideas: Jurnal Pendidikan, Sosial, Dan Budaya*, 10(3), 619. <https://doi.org/10.32884/ideas.v10i3.1640>
- Istiqomah Rahmawati, Moh. Ariz Iqramullah, & Zulkarnain. (2021). MEMPERSIAPKAN GENERASI KHALIFAH (TINJAUAN TERHADAP KEKHALIFAHAN ADAM AS DALAM SURAT AL BAQOROH AYAT 30-37). *At Turots: Jurnal Pendidikan Islam*, 3(1), 1–11. <https://doi.org/10.51468/jpi.v3i1.56>
- Jamil, Z. A., Nurhuda, Alfian, Ulfah, S. M., Rasidin, & Youssef, A. (2025). Program Evaluation Study on Islamic Religious Education in Pesantren: Addressing Educational Degradation in the Digital Era. *Jurnal Pendidikan Agama Islam*, 22(1), 122–139. <https://doi.org/10.14421/jpai.v22i1.11358>
- Li, Y., Chen, D., & Deng, X. (2024). The impact of digital educational games on student's motivation for learning: The mediating effect of learning engagement and the moderating effect of the digital environment. *PLoS ONE*, 19(1 January). <https://doi.org/10.1371/journal.pone.0294350>
- Muhammad Asrul Sultan, Maryam, M., & Wawan Krismanto. (2025). Android-Based Role-Playing Educational Games to Support Strengthening Children's Character Education in Elementary School. *Jurnal Penelitian Dan Pengembangan Pendidikan*, 9(1), 102–113. <https://doi.org/10.23887/jppp.v9i1.82185>
- Nasiruddin, M., Fitriya, Y., & Wardani, I. R. (2025). *TREN PENELITIAN PEMANFAATAN TEKNOLOGI DIGITAL DALAM PEMBELAJARAN AGAMA ISLAM DI SEKOLAH DASAR: TINJAUAN BERDASARKAN JENIS DAN PRODUK PENELITIAN*.
- Okra, R. (2023). The development of educational game-based learning media in natural science subject for elementary school students. *Jurnal Inovasi Teknologi Pendidikan*, 10(2), 122–132. <https://doi.org/10.21831/jitp.v10i2.54890>
- Olamilekan Sanusi, T., & Mizan Sya'roni, M. (2025). 73-82 *Islamic Mobile Learning Innovation As a Transformation of Educational Media Technology in Islamic History This work is licenced under a Creative Commons Attribution-nonCommercial-shareAlike 4.0 International Licence*. <https://doi.org/10.61227>
- Ramadaniati, S., Metandi, F., & Cahyono, B. (2025). RANCANG BANGUN GAME EDUKASI PUZZLE 2D SEBAGAI PENGENALAN ALAT PERMAINAN TRADISIONAL KALIMANTAN TIMUR DENGAN METODE GDLC. In *Jurnal Mahasiswa Teknik Informatika* (Vol. 9, Number 3).
- Saputri, F. H., & Putra, G. A. I. A. (2023). Pengembangan Media Pembelajaran Sejarah Indonesia Berbasis Game Edukasi Untuk Siswa Kelas 7 Madrasah Tsanawiyah Al-Hafizh Rajeg. *G-Tech: Jurnal Teknologi Terapan*, 8(1), 16–25. <https://doi.org/10.33379/gtech.v8i1.3448>