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Role playing game as a learning media: case study on education industry course

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ABSTRACT

Paradoxically, the current level of enthusiasm among the younger generation in studying the education industry is low. This phenomenon can be attributed to multiple factors, including the rapid spread of globalization, which has sparked a heightened interest among the younger generation in acquiring technological knowledge. Researchers employed the Game Development Life Cycle (GDLC) approach, consisting of six stages: initiation, pre-production, production, testing, beta, and release. Testing using the black-box method on 12 modules revealed that all modules performed flawlessly without any issues. Testing of the beta version of the game involved 62 testers who were instructed to play the game and complete a questionnaire. The findings were positive, with an average total score of 4.51 for the game elements. The gaming system performed well during testing, indicating its potential to be well-received by beta testers and users, as well as its ability to enhance students' learning motivation.

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INTRODUCTION

Examining the education sector is crucial for molding one's character and mentality. Through an examination of educational processes, the present generation might acquire knowledge from historical events as a point of reference for resolving contemporary issues (Hernandez-de-Menendez, et al., 2020) Paradoxically, the current level of enthusiasm among the younger generation in studying the education industry is low. This phenomenon can be attributed to multiple factors, including the rapid spread of globalization, which has sparked a heightened interest among the younger generation in acquiring technological knowledge. Additionally, a lack of enthusiasm towards traditional educational methods, which are often perceived as dull, and the utilization of outmoded learning methodologies also contribute to this trend. Comprehending the education sector is crucial for cultivating moral principles and fostering a strong belief system and dedication towards shaping the

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educational identity and character of the next generation (Abbas, et al., 2021). Teachers frequently express dissatisfaction with the state of students in class who lack attention, become easily bored, and even exhibit drowsiness during sessions (Zhao, et al., 2022). In order to cultivate students' understanding of the education sector, it is essential to first stimulate their curiosity in educational methodologies. According to research conducted by Nursyahdiah, a group of students from a university in North Sumatra were observed to have low levels of engagement in learning activities that utilized educational resources as learning materials. The average learning activeness value was 1.73, with a ratio of 44.32% (Nursyahdiyah, et al., 2022). Comprehending the education sector is crucial for cultivating moral principles and fostering a strong belief system and dedication towards the advancement of educational identity and character in the younger population (Li & Li, 2023). Efforts are required to enhance interest in acquiring knowledge about the education sector, in accordance with the ongoing phenomena of globalization.

An outcome of the globalization phenomenon is the emergence of video games that may be accessed via electronic devices. The video game industry market is experiencing continuous growth in tandem with the advancement and evolution of hardware and software technologies. As per the Global Games Market Report 2020, it is projected that the Asia Pacific area will create a revenue of US$78.4 billion from gaming items. The given statistic denotes that this quantity accounts for 49% of the worldwide gaming market, as reported by Newzoo in 2020. Indonesia is a prominent gaming market in Southeast Asia. According to Primasari (2022), Indonesia generated a gaming market income of 1.32 billion US dollars in 2020. Essentially, video game software is developed as a virtual medium for enjoyment, but it can also be utilized for educational purposes. Utilizing video games as an educational tool can significantly enhance student motivation and improve learning outcomes (Yu et al., 2021). Pratama's research indicates that the utilization of video games as an educational instrument has garnered favorable feedback from scholars. Consequently, the presence of educational games enhances the appeal and engagement of the learning system (Bouchrika et al., 2021). Prior studies have explored the application of gamification in various educational contexts, such as health education through survivor virus games (Suppan et al., 2020), computer assembly games for junior high school students (Lee et al., 2021), role-playing educational games (Irkinovich, 2022), educational games focused on Virtual Reality (Oyelere et al., 2020), educational games centered around educational places, educational games for educational places in Indonesia (Hidayati, 2020), educational games for children to enhance reading, writing, and counting skills (Rakimahwati & Roza, 2020), Indonesian cultural educational games (Sudarmilah et al., 2020), Sundanese language educational games (Wulandari et al., 2023), digital learning design educational games (Mahsusi et al., 2021), general educational games (Zeng et al., 2020), and ethics learning games (Kaimara et al., 2022).

The study primarily aimed to create a 2-Dimensional Role-Playing Game (RPG2D) instructional game centered around the growth and progression of the education sector in Indonesia. The researchers employed the Game Development Life Cycle (GDLC) approach for game design. The GDLC method was selected due to its numerous benefits, such as

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aiding in project planning and management, enhancing communication and collaboration (Garcia et al., 2020), facilitating the development of high-quality games (Gurbuz & Celik, 2022), improving the efficiency and effectiveness of game development, reducing costs, and enhancing user satisfaction (Bauer et al., 2020). The aim of developing this instructional video game is to enhance the motivation and knowledge acquisition of young individuals in Indonesia through frequent utilization of the program.

METHODS

The researchers employed the Game Development Life Cycle (GDLC) approach, consisting of six stages: initiation, pre-production, production, testing, beta, and release (Fitzgerald & Ratcliffe, 2020). Figure 1 is the flowchart illustrating the GDLC approach.

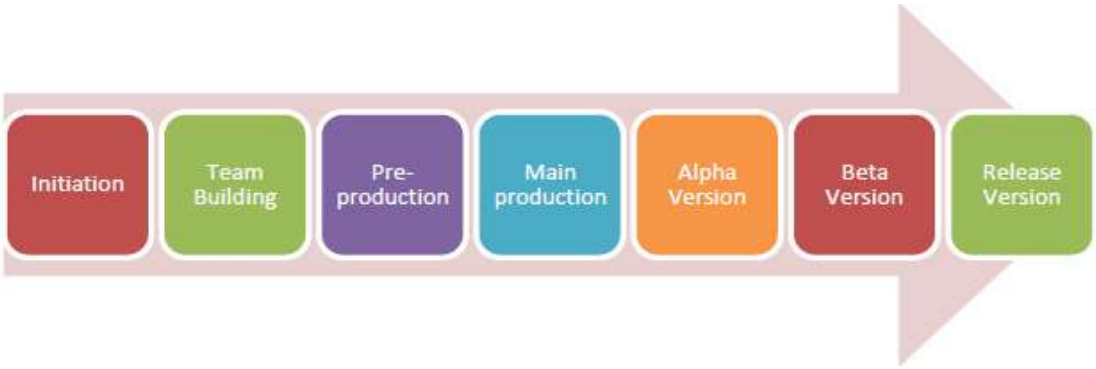

Figure 1. Game Development Life Cycle approach

The commencement stage commences with the formulation of a preliminary concept for the game to be developed. The researchers will engage in brainstorming sessions focused on the study topic in order to generate outputs that align with the research writing objectives. The subsequent phase is pre-production, which falls within the production cycle phase. During this phase, the game design and prototype will be developed using the concepts and descriptions that were generated in the start step. The game design will mostly center around the narrative, the game's characters, the locales, and other relevant details, all of which will be documented in the Game Design Document (GDD). The completion of this stage will be achieved once the redesigned design has been officially authorized and recorded in the Game Design Document (GDD). The production step involves acquiring assets, creating source code, and integrating them. During this phase, the game idea and prototype undergo further refinement, incorporating more comprehensive systems and assets. During this stage, the development process builds upon the feedback from the previous stages and only permits minimal modifications, if necessary. The subsequent phase involves the testing of the prototype or alpha version of the game that was developed during the development stage. Internal developers do this step utilizing black box testing techniques to evaluate the functioning of the game under construction. During this phase, the production cycle will undergo continuous iterations until it is determined that the game is fully developed and prepared to transition from the production cycle to the beta stage. The final phase is the beta testing stage, which occurs

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after a video game has successfully completed the alpha version and has been approved by the developer. It involves creating a beta version of the game that is prepared for testing by beta testers or potential users who have been selected for this purpose. The testing methodology uses a Likert scale questionnaire to quantify the degree of utility and evaluate the efficacy of the game's features. Table 1 displays the inputs and outputs for each stage.

Table 1. GDLC stages data

Stage	Input	Output
Initiation	Adjustment of game direction in line with research objectives	Blue print and game concept
Team Building	Needs identification	Team structure and responsibilities
Pre-Production	Game idea, requirement study, story line, target platform	Game Design Document (GDD), prototype, concept art, animation, sound design
Main Production	GDD, prototype, schedule, developer tools	Coded gameplay, UI/UX, animation, sound
Alpha Version	GDD, high-fidelity prototype, schedule, developer tools	Alpha build, fixed gameplay, improved graphics and audio quality, bug fixes

*)primary research data

RESULTS AND DISCUSSION

A MindMap outlining the concept and description of the video game was generated during the initiation phase. There are two primary areas of interest, specifically Game Design and Educational Facilities. Game Design include the evaluation of the platform, engine, visuals, genre, and approach utilized in the development of a game. The outcome of the brainstorming session concluded that the game created was designed for mobile devices and specifically targeted the Android platform, taking into account the fact that all students possess Android smartphones. The Godot engine was selected for game development due to its inherent advantages, such as its comprehensive feature set, multi-platform support, user-friendly interface, and open-source nature. The image was rendered in a 2-dimensional format to enhance its conciseness, facilitate its shaping, and expedite the process. The game genre was selected as action role-playing in order to maximize its potential as a compelling narrative. The instructional tool focuses on the historical progression of education in Indonesia, spanning from the colonial era to the present day. The choice to colonize Indonesia, particularly by the Dutch and Japanese, was motivated by the allure and historical significance that resonated with the Indonesian population, particularly in the realm of education.

To establish a proficient team in game creation, the team initially establishes a shared objective and assembles a team of suitable personnel. Subsequently, tasks and duties are equitably distributed among team members, and this is followed by training sessions aimed at enhancing individual talents. The team places a strong emphasis on open communication and active cooperation, which enables them to generate unique ideas and innovative solutions. Regular assessment of performance and work procedures enables teams to gain

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insights from errors and consistently enhance their efficiency, thereby fostering a constructive and encouraging work atmosphere to attain project objectives. Title of the game: "Indonesian Education History: Adventure Time".

The Game Design Document includes: (1) Short Description: "Indonesian Education History: Adventure Time" is an educational video game that enables players to delve into significant epochs in the educational history of Indonesia. Participants will take on the persona of a student who travels through time to gain knowledge about significant events and influential individuals in the evolution of education in Indonesia. (2) Objectives of the game: Instruct players on significant milestones in the educational history of Indonesia. Promote the comprehension of the significance of education in the process of constructing a nation. Enhance the player's comprehension of principles such as collaboration, unwavering determination, and fairness. (3) Notable characteristics: Time Travel Adventure: Participants will go through several historical periods in Indonesia's educational history, ranging from pre-colonial days to the current era. Academic Mini-games will be used to simulate each historical period and impart crucial concepts, like the significance of education in Indonesia's fight for independence, alterations in the curriculum, and the establishment of the national education system. (4) Historical Figures: Users will engage with notable figures from the past, such Ki Hajar Dewantara, Kartini, and other influential educators. This interaction will offer users a deeper understanding of the educational history. (5) The Achievement and Reward System grants players particular accolades and incentives at the successful completion of each historical period. These prizes encompass supplementary content and further insights into the subjects studied.

During the production stage, the Low-fidelity Prototype and Game Document Design are transformed into tangible scenes or models that can be implemented in the video game. A scene refers to a collection of nodes that are arranged in a hierarchical manner to facilitate the execution of the game or to be used as an instance within another scene. Figure 2 depicts the visual representation of the game's setting.

Figure 2. In game scene

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The primary objective of the alpha version phase in the development of the game "History of Indonesian Education: The Adventure of Time" is to incorporate fundamental elements, including a time-traveling adventure and rudimentary educational mini-games. During this phase, the creation of character designs and historical figures commenced, alongside the implementation of a basic achievement system. The primary objective of the alpha version was to assess the viability of the concept and fundamental mechanics, while also collecting initial feedback from internal testing to enhance and advance the game during the beta phase. During the beta stage, efforts were focused on enhancing the game's features and content. This included the introduction of more comprehensive educational mini-games, expansions to the achievement system, and improvements to the graphical quality. The purpose of the beta version is to assess player engagement and satisfaction, address technical problems, and make final adjustments prior to the game's official release, using external testing with a limited number of players.

Figure 3. Fighting scene on released version

Internal developers will test the scene or alpha version utilizing black-box testing techniques to verify the functionality of the game under construction. During black-box testing, 5 scenarios were tested, including the "Player" scene. Two primary modules were tested for the "player" scene: player.gd, consisting of 5 sub-modules, and player.tscn, consisting of 7 sub-modules. The modules are acquired according to the essential functionality required for the scene to operate the game. All modules in the alpha test have functioned correctly, producing the desired outcomes with different user inputs. The player can move and perform actions such as walking and attacking the adversary based on the user's input as indicated by the test results. The score rises upon successful mission completion and results in a game over if the mission is not completed.

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Beta testing utilized a Likert scale questionnaire ranging from 0 to 5, where 0 represented the lowest score and 5 represented the highest score. The questionnaire aims to gather user feedback, evaluate the utility level, and analyze the functionality of game elements. Beta testers are initially granted permission to install the video game system on an Android smartphone and utilize it. Subsequently, the tester can complete a questionnaire via the URL given by the researcher for analysis. 62 respondents participated in beta testing. A sample size of 62 respondents can be utilized for research purposes to get feedback (Adam, 2020). Participants were provided with a questionnaire consisting of 19 inquiries related to concentration, challenge, ability, control, purpose, feedback, and scope. The questions may be found in Table 2.

Table 2. Questionnaire inquiries

Stage	Input
Goal	The primary goal of the game is easily comprehensible.
	The game's side objectives are easily comprehensible.
Scope	The player perceives time going swiftly during gameplay.
	Players are emotionally invested in the game.
	Players experience decreased sensitivity to their surroundings while engaged in the game.
Control	The game UI and rules are user-friendly and straightforward.
	Players get a sense of control over the interaction units in the game and the game interface.
	Players can experience a strong sense of agency and impact from their decisions within the game.
Challenge	The game offers varying levels of difficulty.
	The difficulty level rises as the player's proficiency improves.
	The game presents fresh obstacles as the narrative unfolds.
Ability	Players are instructed to complete a brief tutorial at the start of the game.
	As the game advances, it can enhance the player's talents.
	Players are fairly compensated for their hard work and improvement in skills.
Concentration	The game captivates the player's attention and maintains their focus consistently.
	Players do not perceive new duties as burdensome.
Feedback	Players can consistently be aware of their status.
	Players are provided with feedback on their actions.

*)questionnaire

The beta testing results yielded an average total score of 4.51 or 85.66%, which was rated as very good. All participants favored the presence of interactive educational tools and concurred that game-based learning resources might be beneficial as educational aids. Ten respondents believed that game-based learning media can be beneficial as a learning tool. Respondents indicated that games enhance the learning experience by making it more engaging, enjoyable, and motivating, while also facilitating comprehension.

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CONCLUSION

The research indicates that the role-playing game for the Education Industry course, focusing on the history of education in Indonesia, has been effectively built using the GDLC method. Testing using the black-box method on 12 modules revealed that all modules performed flawlessly without any issues. Testing of the beta version of the game involved 62 testers who were instructed to play the game and complete a questionnaire. The findings were positive, with an average total score of 4.51 for the game elements. The gaming system performed well during testing, indicating its potential to be well-received by beta testers and users, as well as its ability to enhance students' learning motivation, this is in line with another research (Mendoza, 2023).

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