EDUCATIONAL GAME STORY ADVENTURE OF CAKRA INDEPENDENCE HISTORY VERSION

Muhammad Rizki[1], Esti Wijayanti[2] , Ahmad Abdul Chamid[3]

1, 2, 3 Informatics Engineering Study Program, Faculty of Engineering, Universitas Muria Kudus
e-mail: 202151008@std.umk.ac.id[1], esti.wijayanti@umk.ac.id [2] , abdul.chamid@umk.ac.id[3]

ABSTRACT

The educational game "Story Adventure Of Cakra" with the theme of Indonesian independence history aims to address the lack of student engagement and understanding in history lessons among elementary school students in grades 3 and 4. By utilizing the Game Development Life Cycle (GDLC) method and Construct 3 engine, this game integrates adventure-based learning with a quiz system to create an interactive and enjoyable educational experience. Data collection involved interviews, participatory observations, and literature studies with students and history teachers at SD 2 Tanjungrejo, Kudus Regency. Blackbox testing results showed all game features, including navigation, gameplay, and quiz evaluations, functioned effectively. Trials with students and teachers revealed increased motivation and engagement, with the game significantly enhancing students' understanding of historical events. The study concluded that "Story Adventure Of Cakra" is an innovative alternative for history education, combining entertainment and learning to create a positive and effective learning environment. Future development is encouraged to expand its reach and improve functionality.

Kata Kunci: *Educational Game, Independence History, GDLC, Construct 3, Interactive Learning.*

A. INTRODUCTION

The development of information technology is currently increasing rapidly. Its use in the lives of society in general has also experienced a very large increase. This also occurs in the world of education, where information technology has a significant impact on the way educational institutions carry out their functions. Aziz et al. explained that major developments in the field of information technology affect the role of educational institutions, encouraging educational institutions to continue to adapt. Educational institutions are now competing to utilize their financial resources to update information technology, with the aim of improving the quality of educational services, accelerating access to information, and creating a more effective and efficient learning environment. This effort shows the commitment of the world of education in responding to challenges and opportunities in the digital era [1]. The research was conducted at SD 2 Tanjungrejo, located in Jekulo District, Kudus Regency, with the study subjects being 3rd and 4th grade students. In this school, history lessons were predominantly taught using traditional lecture methods. As a result, many students experienced boredom during the lessons, leading to disengagement. Some students distracted themselves by playing with their peers, others fell asleep, and a few resorted to playing games on their smartphones. This lack of engagement negatively impacted their comprehension of the material. When asked to raise questions or participate in discussions, students rarely responded, further highlighting the inefficacy of the teaching approach. Additionally, when assigned practice questions, many students struggled to complete them successfully. The use of educational games as a supplementary teaching medium for history, particularly on the topic of independence, aims to

provide students with a visual and interactive learning experience. This approach is intended to boost their motivation, simplify the concepts of independence history, and promote better retention through active engagement and feedback. With technological advancements, educational games have proven to be effective tools for delivering learning materials, especially in replacing traditional lecture-based methods. Such games make the learning process more enjoyable and interactive, helping students understand and retain information more effectively. Recognizing this potential, we developed an educational game titled Story Adventure of Cakra: Independence History Version. This game combines elements of adventure and history through an interactive platform where players collect flag items and complete quizzes related to independence history.
.

B. LITERATURE REVIEW

1. Related

This study designed an educational game entitled "History Of Freedom" which carries the concept of a platformer game. This game aims to be an interesting and interactive digital learning media, so that it can improve students' understanding of the history of Indonesian independence. The research method used is the Waterfall method, which includes the phases of needs analysis, design, implementation, testing, and maintenance. The results of the study showed that the game "History Of Freedom" was successfully tested well, where all button functions and gameplay ran smoothly. Thus, this game is expected to be a solution to increase the interest and understanding of the younger generation towards Indonesian history [2].

This study focuses on the development of an educational game application "Heroes of Indonesia" aimed at introducing the history of Indonesian independence to the younger generation through interactive and interesting media. In this context, this game is designed with a method that includes data analysis, system design, program development, testing, implementation, and evaluation. This game integrates educational elements in the form of quizzes and challenges related to history, making it an effective learning tool. The results of the study indicate that this game has a high level of feasibility as an RPG (Role Playing Game)-based learning media, with a validity reaching 85%. This game not only presents information about important historical events such as the Diponegoro War and Bandung Lautan Api, but also introduces aspects of Indonesian culture, such as national songs and traditional clothing [3].

Educational games are designed to create an interesting and fun learning atmosphere, which can increase interest in learning and help students remember and understand the material better. Research shows that children understand material more easily in the form of games, and learning with game elements can improve thinking skills and concentration. An example of an educational game is "Smart Adventure," which was developed with Construct 2 software and presents general knowledge quizzes covering topics such as language, history, and mathematics. Despite its limitations in material, its interesting and interactive design provides a fun learning experience. This educational game functions as a learning medium as well as a tool to increase students' interest and motivation to learn, making it relevant in modern education [4].

This study focuses on developing a 3D game entitled "Lawan Narkoba" which uses the Game Development Life Cycle (GDLC) method. The main objective of this game is to educate and prevent drug abuse against health and social life. In the development process, this game involves several stages, including design, production, and testing. The test results

showed that 97.3% of 30 respondents understood the material presented in the game, and the final results of the beta test reached 93%, which indicates a very good category [5].

The design of a 2D educational game aims to introduce the history of historical buildings on Jalan Braga, Bandung, to Generation Z, which is a generation born between 1995 and 2010 and is known to be familiar with digital technology. In this context, the game is designed using a pixel art style and a fantasy adventure genre, which is expected to attract teenagers to learn about the history of the building in an interactive and fun way [6].

2. Theoritical Basic

According to Gus Dur (Abdurrahman Wahid), independence is more of a process of struggle for self-determination than simply a state of freedom from all problems. He emphasized that independence is a fundamental right of every human being that must be guaranteed in social and state life. The main enemy of independence is arbitrariness in the use of power [7]. Game is an interface interaction with the user to produce visual feedback on a video device. The word video in traditional Video games is stated as a raster display device. However, as the term "Video game" is increasingly used, the term video game can now be used as a reference to games on any display device. The electronic device system used as a place to play Video games is called a platform, an example of this is a personal computer and a video game console. This platform is from the largest level such as a mainframe computer to the smallest, namely a mobile device. Specialized video games such as arcade games, while previously common, have gradually declined in use [8]. Adventure games are different from other games.

Adventure games are interactive stories played by the protagonist, the player himself. The basic elements or essence of this game are the storyline and exploration. Adventure games usually have their own economic system and have more action (problem solving and combat) in going through the storyline that has been arranged by the system [9].

C. METHODOLGY

This study uses qualitative methods and the Game Development Life Cycle (GDLC) method. The qualitative method is used to evaluate how educational games based on the history of Indonesian independence can improve understanding and knowledge of history among students.

1. Research Methods

In this qualitative method there are 2 stages, namely:

a. **Research Subject**

The subjects involved in this study were 3rd and 4th grade students who were the main target users of the game, as well as history teachers who contributed to the development of the history of independence material in this game.

b. **Data Collection Technique**

Data were collected through :

1) Interviews

With students and teachers to understand their views on educational games and the historical independence material presented.

2) Participatory Observation

Observing the interactions and responses of students while playing the game, to see to what extent the game helps them understand the historical material.

2. System Development Method

In the game development process, researchers use the Game Development Life Cycle (GDLC) method, which is a game development that emphasizes interactive aspects that have six development phases, starting from the initialization/concept creation phase, preproduction, production, testing, beta and release [10]. The GDLC stages in this project include the following image:
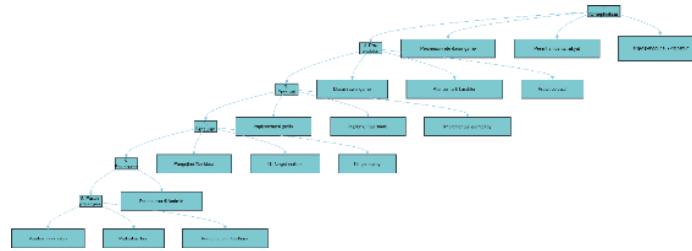
Figure 1 Game Development Life Cycle Method

a. Conceptualization Phase

At this stage, the basic idea of the educational game "Story Adventure of Cakra: Versi Sejarah Kemerdekaan" is formed, covering the theme of Indonesian independence history, educational values, and determining the target users (students in grades 3 and 4). The purpose of this stage is to ensure that the game becomes an interesting and educational learning medium.

b. Pre-production Phase

At this stage, the initial concept of the game is further developed, including the preparation of the storyline, development of the Cakra character, design of the game mechanism, and creation of visual and audio elements. In addition, a game prototype is also created to test the concept and gameplay that has been designed.

c. Production Phase

This stage is the core of the game development of all game elements such as graphics (created using Adobe Photoshop), sound effects and music (edited using Audacity), this game uses the Construct 3 game engine with HTML 5 and Javascript integration.

d. Testing Phase

The game that has been developed is then tested to detect and fix bugs, errors, or problems in the gameplay. In addition, this test also aims to measure the extent to which students respond to and understand the educational content presented in the game.

e. Release Phase

After going through the testing process, the game will be released to the mobile platform (Android) and introduced to the target users, namely children aged 7-12 years.

f. Post-release Phase

This stage includes support activities after the game is launched, such as updating historical content, fixing bugs that may be found, and collecting feedback from players for future game improvements.

D. RESULTS AND DISCUSSION

1. Design Stage

In the planning process of developing the educational game "Story Adventure Of Cakra", there are two main elements created, namely storyboard and flowchart. Storyboard is used to visualize every aspect of the appearance and interaction in the game, such as the main menu, book selection, story narrative, gameplay, to the evaluation system. Meanwhile, the flowchart is designed to describe the flow of logic and navigation between displays in the game, ensuring that each interaction is properly connected to provide an optimal playing experience. These two elements serve as a basic reference in developing educational games that are interactive and in accordance with learning objectives.

2. Flowchart

To provide a clearer understanding of how this game works, here is a flowchart that explains the flow of interaction and navigation in the game. The flowchart describes the journey of the user, from the initial display to the final stage of the game. As shown in the image below:
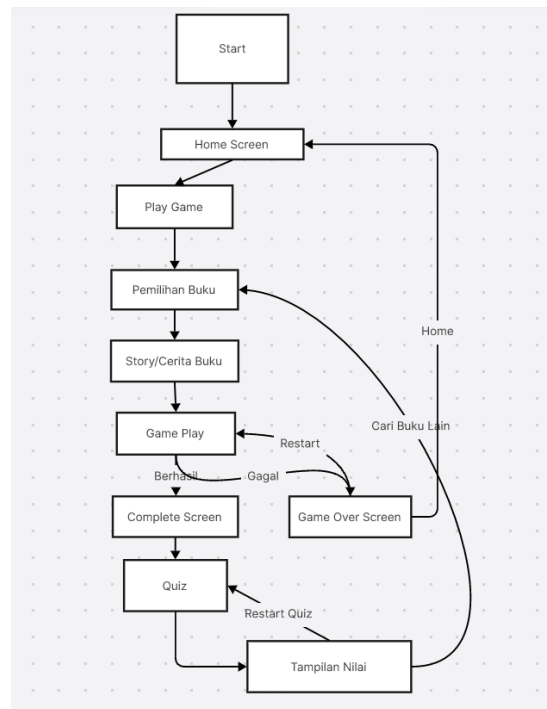
Figure 2 *Flowchart*

The flowchart above illustrates the interaction flow in the educational game "Story Adventure Of Cakra" which begins at the initial stage (Start), where the user enters the main screen (Home Screen) as the navigation center. From the main screen, the user can choose to start the game with the Play Game option. Next, the user is directed to the book selection stage (Book Selection) which allows the user to choose the material or story to be played. After selecting the book, the user will enter the Story/Book Story stage which presents a narrative or storyline as an introduction before starting the gameplay.

The gameplay stage (GamePlay) is the core of the game, where the user must complete the given challenges. If successful, the user will be directed to the Complete Screen to proceed to the evaluation stage in the form of a quiz (Quiz). Conversely, if it fails, the user will be directed to the GameOver Screen, with the option to repeat the game (Restart). At the quiz stage, the user answers evaluation questions related to the content of the book or gameplay that has been played. Once completed, the user can see the results on the score display. In addition,

this flowchart also provides flexibility for users to return to the main screen at any time or choose another book to play. The interaction flow shown ensures that each navigation is well connected, providing a smooth, educational and structured gaming experience.

3.   Storyboard

Storyboard plays an important role in the development of the educational game "Story Adventure Of Cakra" as a visual guide that describes the flow and user interaction. This game is designed to educate players through Cakra's journey in exploring the history of Indonesian independence. Each scene in the storyboard is equipped with a description that explains the interface elements and actions that can be performed by the user, the storyboard covers various scenes ranging from the main menu, storybook selection, to gameplay and quizzes. The following is a draft of the storyboard shown below:
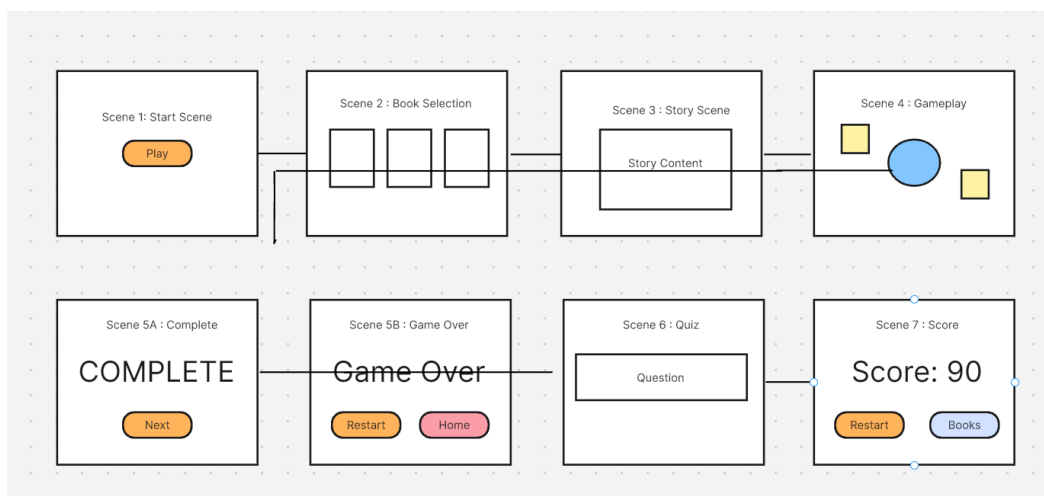
Figure 3 *StoryBoard*

4.   Implementation Stage

The following is the interface of the game "Story Adventure Of Cakra" which includes the main page, the history book selection page, and the short narrative page. The interface design is designed with a simple, attractive concept and is adapted for elementary school children. As shown in the image below:

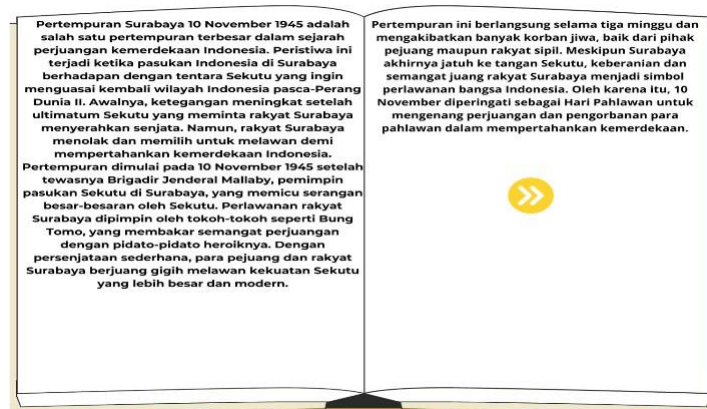Figure 4 *Home*

Figure 5 *Book Selection*

Figure 6 *Story Narrative*

The game implementation stage begins with the main page that presents the "Play Game" button as the start of the game. After the button is clicked, the player will be directed to the book selection page that is the basis of the story in the game. The gameplay is designed to require players to collect certain items such as flags, if the player is successful, the system will display the Complete screen that directs to the quiz stage. If it fails, the "GameOver" screen appears with the option "Restart" to restart or "Home" to return to the main menu. After completing the quiz, the score is displayed with the option to repeat or re-select another book. The following is a display of the gameplay consisting of the game display, quiz page, and the results of the scores obtained by the player:

Figure 7 *Gameplay*

Figure 8 *Quiz*

Overall, the test results show that the game "Story Adventure of Cakra" has met all planned functional criteria and is ready for use by users.

5.   Testing Phase

Testing is the process of evaluating software to identify differences between actual and expected results, and to assess the performance of its features. Testing is considered effective if it can reveal and find previously unknown errors, not just ensure that the system is error-free. In the educational game "Story Adventure Of Cakra" using Blackbox testing to ensure that all features and functions run according to specifications and user needs. This testing focuses on testing the functionality of the application without considering its internal code structure. Testing includes evaluating the navigation menu, user interaction, game flow, and evaluation systems in the game. The following are the results of the Blackbox testing that has been carried out:

Table 1. Blackbox Testing

No	Component	Test Scenario	Expected Result	Test Result	Status
1	Main Page	Click the Play button	Directs the user to the Book Selection page	Successfully displayed	Valid

2	Main Page	Click the Exit button	Closes the application	Successfully closed the application	Valid
3	**Book Selection**	**Click on a book**	**Directs the user to the Story Narrative page**	**Successfully displayed**	**Valid**
4	Story Narrative Page	Click the Next button	Displays the Gameplay page	Successfully displayed	Valid
5	Gameplay	Item collection	The system records the collected items	Successfully collected specific items	Valid
6	Gameplay	Failing to collect all items or hit by an enemy more than 3 times	Displays the Game Over screen	Successfully displayed	Valid
7	Gameplay	Collecting all required items	Displays the Completion screen	Successfully displayed	Valid
8	Gameplay	Click the Next button	Proceeds to the Quiz menu	Successfully proceeded to Quiz	Valid
9	Gameplay	Click the Right Arrow	The character moves to the right	The character moved to the right	Valid
10	Gameplay	Click the Left Arrow	The character moves to the left	The character moved to the left	Valid
11	Gameplay	Click the Up Arrow	The character jumps	The character jumped	Valid
12	Game Over	Click the Restart button	Restarts the gameplay	Successfully restarted	Valid

13	Game Over	Click the Home button	Returns to the Home menu	Successfully returned to Home	Valid
14	**Quiz**	**Answer all the questions**	**Displays the Quiz Score**	**Successfully displayed the Quiz Score**	**Valid**
15	Quiz Score	Click the Restart Quiz button	Restarts the Quiz	Successfully restarted the Quiz	Valid

6.   Evaluation Stage

The evaluation stage is carried out to measure the effectiveness and acceptance of the game as a learning medium. The evaluation uses a questionnaire method involving 30 students of SD 2 Tanjungrejo as respondents using a questionnaire with a Likert scale with 5 assessment levels:

1. Strongly Agree (SA) = 5
2. Agree (A) = 4
3. Neutral (N) = 3
4. Disagree (D) = 2
5. Strongly Disagree (SD) = 1

Table 2. Questionnaire

No	Question	Strongly Agree (SA)	Agree (A)	Neutral (N)	Disagree (D)	Strongly Disagree (SD)	Average Score
1	Does the game help you understand the history of Indonesia's independence?	18	9	3	0	0	4,5

2	Is the historical material in the game presented clearly?	15	12	3	0	0	4,4
3	Does the quiz in the game help measure your understanding?	16	11	3	0	0	4,4
4	**Does the game help you remember historical figures?**	**14**	**13**	**3**	**0**	**0**	**4,3**
5	Does the story in the game help you understand the sequence of events?	15	12	3	0	0	4,4
6	Is the game visually appealing?	20	8	2	0	0	4,6
7	Are the characters and objects in the game clearly visible?	17	10	3	0	0	4,5
8	Are the writings and texts in the game easy to read?	16	11	3	0	0	4,4

No	Question						
9	Are the buttons and menus easy to find?	18	9	3	0	0	4,5
10	Are the animations in the game engaging?	19	8	3	0	0	4,5
11	Is the game easy to play?	17	11	2	0	0	4,5
12	Are the game instructions easy to understand?	15	12	3	0	0	4,4
13	**Are the character controls in the game easy to use?**	**16**	**11**	**3**	**0**	**0**	**4,4**
14	Is the game navigation menu easy to use?	15	12	3	0	0	4,4
15	Is the quiz easy to understand?	14	13	3	0	0	4,3
16	Does the game make learning history more enjoyable?	22	7	1	0	0	4,7
17	Do you want to play this game again?	20	8	2	0	0	4,6

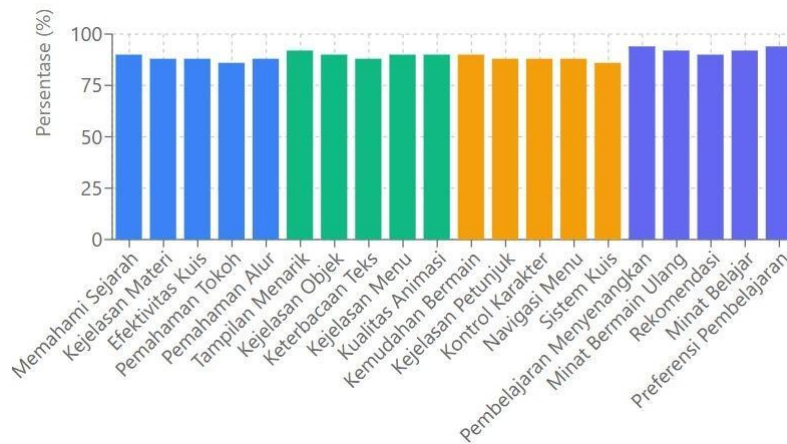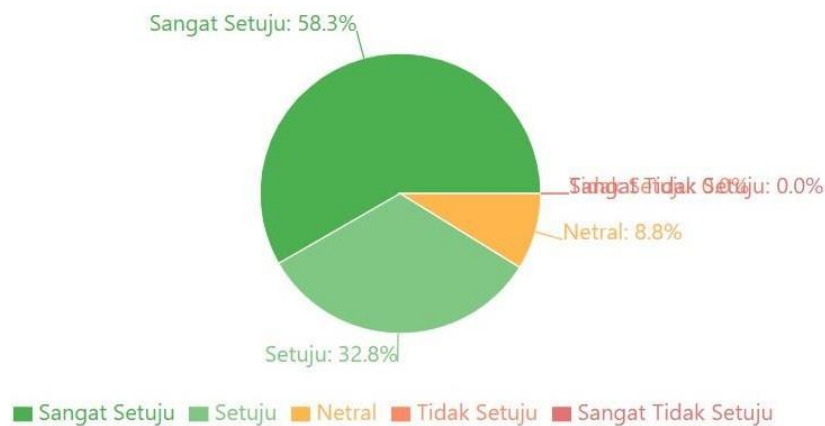| 18 | Would you recommend this game to a friend? | 19 | 8 | 3 | 0 | 0 | 4,5 |
| 19 | Does this game make you more interested in learning history? | 21 | 7 | 2 | 0 | 0 | 4,6 |
| 20 | Do you prefer learning history using this game? | 23 | 5 | 2 | 0 | 0 | 4,7 |

Figure 9 *Average Questionnaire Score*

Figure 10 *Distribution of Questionnaire Answers*

Analysis Results:

Based on the results of the evaluation conducted on 30 elementary school students, the overall satisfaction level was 89.6%, with the highest score being the interest aspect (92.7%), followed by the interface (90%), ease of use (88%), and learning (88%). Analysis of student responses showed that the game successfully made history learning more enjoyable (94%) and effectively increased understanding of the material (90%). These results indicate that the game "Story Adventure Of Cakra" has succeeded in becoming an effective and interesting learning medium for the history of Indonesian independence.

E. CONCLUSION

The educational game "Story Adventure Of Cakra Versi Sejarah Kemerdekaan" has been successfully developed using the Game Development Life Cycle (GDLC) method and Construct 3 as an interactive learning medium that aims to increase students' understanding and interest in learning about the history of Indonesian independence. Based on the results of blackbox testing carried out on all game features including the navigation system, gameplay, and quizzes, it functions well. The response of students of SD 2 Tanjungrejo to this game is very positive with an average score reaching 89.6%, interest reaching the highest score of 92.7%, which shows that this game has succeeded in making history learning more interesting

and fun. Thus, this game can be an innovative alternative in history learning for elementary school students.

F.   SUGGESTION

Based on the results of the evaluation and research conducted, there are a number of recommendations for further development of the educational game "Story Adventure of Cakra" with the theme of independence history for SD 2 Tanjungrejo. First, it is necessary to simplify the game controls and add a more comprehensive tutorial. Considering that ease of play is one of the aspects with the lowest value, the tutorial needs to be designed to be more interactive with clear and easy-to-follow steps. This is very important considering that the main target of this game is elementary school students. The tutorial can include guidance on how to explore historical stories, complete missions, and understand the educational context in the game. Second, game development can be focused on adjusting the adaptive level of difficulty according to the player's ability. This system will allow novice players to learn without pressure while providing more challenges for students who already understand the material. The quiz system in the game also needs to be improved by adding variations in the form of questions, interesting animated feedback, and more motivating rewards so that students are more enthusiastic about learning history.

Third, from a technical perspective, the addition of a save progress feature is very important to support players to continue the game from the last point reached. With this feature, students can set the playing time without having to start over. In addition, it is necessary to consider developing the game to other platforms such as iOS or the web version to increase accessibility and user reach. Fourth, to enrich educational content, the game can present more historical stories about the Indonesian independence struggle, such as the story of the battle in Surabaya, the proclamation of independence, and national figures. Each story can be supplemented with additional information about the historical context, values of the struggle, and relevance to today's life. This will help students understand more deeply about the importance of maintaining the spirit of unity and nationalism. Finally, further research needs to be conducted to measure the effectiveness of this game in increasing students' knowledge and interest in the history of independence. Research can also evaluate the contribution of this game in fostering students' love of national history and local culture in the digital era.

REFERENCE

[1] Aziz, Tahir, M., Khan, and R. Singh, "Effects of Information Technology Usage on Student Learning: An Empirical Study in the United States," Int. J. Manag., vol. 27, no. 2, 2010.

[2] Bangun, R., Sejarah, G. E. P., Yulianto, A., Widodo, D. W., & Sinta Wahyuniar, L. (2023). Proceedings of SEMNAS INOTEK (National Seminar on Technological Innovation) 636. In August (Vol. 7). Online.

[3] Kaurie, F., Purwanto, A., & Minarni, M. (2020). Development of Indonesian Game Technology for 2D Game "HEROES OF INDONESIA" Using Unity 2D Engine for Mobile. Jurnal Ilmu Komputer Dan Bisnis, 11(2), 2483–2494. https://doi.org/10.47927/jikb.v11i2.12

[4] Sunengsih, A., Hardiansyah, A. M., & Lisana, D. N. H. (2023). Development of the Educational Game "Petualang Cerdas" Based on the Web Using the MDLC Method. Media Jurnal Informatika, 15(2), 162. https://doi.org/10.35194/mji.v15i2.3907

[5] Roselina Siregar, M. (2020). Journal of Applied Multimedia and Networking (JAMN) 3D Game "LAWAN NARKOBA" Using the Game Development Life Cycle (GDLC) Method. JAMN, 4(1). http://jurnal.polibatam.ac.id/index.php/

[6] Nahrulhat, M., & Januarsa, S. D. (n.d.). Design of a 2D Educational Game to Introduce the History of Buildings Around Braga Street to Generation Z in Bandung City.

[7] NU Online Jakarta. (n.d.). Seven Points of Independence According to Gus Dur. Retrieved from https://jakarta.nu.or.id/literatur/tujuh-butir-makna-kemerdekaan-menurut-gus-dur-uJ3Zm.

[8] Jailani, R., & Purwanto, A. (2019). Design and Development of the 2D Game "DAYAK RUN" with Endless Running Genre for Android. Inform: Jurnal Ilmiah Bidang Teknologi Informasi Dan Komunikasi, 4(2).

[9] Adams, E. (2013). FUNDAMENTALS OF GAME DESIGN, Third Edition. United States, New Riders, 1(1).

[10] R. A. Krisdiawan, "Implementation of the Game Development Life Cycle (GDLC) Model and Linear Congruential Generator Algorithm in Puzzle Games," Nuansa Inform., vol. 12, no. 2, pp. 1–9, 2018. [Online]. Available: https://journal.uniku.ac.id/index.php/ilkom/article/view/1634/1211.