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Android Educational Game for Pancasila and Civic Education Learning

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Abstract **In the digital era, traditional teaching methods often fail to engage students, especially in Pancasila and Civic Education. Lack of understanding of Pancasila values leads to declines in religious, humanitarian, and unity values among students, evidenced by frequent fights and bullying. To address this, an interactive Android-based game, "Cerdas Pancasila," was developed with quizzes and puzzles to enhance students' understanding of Pancasila values. Using the Digital Game-Based Learning (DGBL) method, the study included five phases: analysis, design, development, quality assurance, and implementation. The analysis phase identified the need for engaging educational media for students aged 9 to 12. The design phase outlined instructional goals, and the development phase used Android Studio with Kotlin and Java to create the game prototype, which was distributed as a .apk file in the implementation phase. Quality assurance involved alpha and beta testing, resulting in a 90.2% acceptance rate, with 17 out of 18 students stating the game increased their knowledge about Pancasila.**

Keywords**: Pancasila, android, game, education, DGBL.**

I. INTRODUCTION

In the digital transformation era, traditional educational methods are often less effective in increasing student interest and motivation, particularly in subjects such as Pancasila and Civic Education. Pancasila is crucial for building character and instilling national values in students and plays a vital role in shaping their character and morality [1]. A lack of understanding of Pancasila's values leads to a decline in religious, humanitarian, and unity values among students, as evidenced by frequent student conflicts [2]. Additionally, differences in religion, race, and social groups often lead to bullying cases in elementary school students, which can potentially lead to suicide [3]. To address these issues, it is essential to strengthen Pancasila and Civic Education to build character and instill national values in students. This subject aims to instill the noble values of Pancasila, which is the foundational ideology of Indonesia. However, the challenges in teaching this subject are significant. Traditional teaching methods, such as lectures, often fail to capture students' attention due to their monotonous and less interactive nature [4]. As a result, students frequently lose interest and motivation to learn, affecting their understanding and appreciation of Pancasila's values.

Meanwhile, digital transformation has also opened new opportunities in various aspects of life, including education [5]. Advanced technology and broader internet access have changed how we interact, work, and learn. Rapid technological advancements allow the learning experience to be enhanced by integrating educational content with interactive digital platforms. Technological progress offers innovative solutions to address challenges in the education sector. Digital devices such as computers, tablets, and smartphones have become an integral part of students' daily lives [6]. This technology can create a more interactive and engaging learning environment. One promising approach is game-based learning. Game-based learning has proven effective in increasing student engagement and motivation [7]. Games have interactive features that create an engaging educational environment, making learning enjoyable and effective [8].

Game-based learning leverages game elements such as challenges, rewards, and increasing difficulty levels to create an enjoyable learning experience [9]. Research shows that games can enhance students' intrinsic motivation, strengthen engagement, and improve information retention. Games can also provide immediate feedback that helps students correct their mistakes and understand the material better. In the context of Pancasila and Civic Education, games can be used to introduce complex concepts more simply and enjoyably.

This research aims to design and develop an Android-based game application as an additional teaching tool for Pancasila and Civic Education. The proposed game-based learning application is intended to address the shortcomings of traditional teaching methods by providing an interactive platform that enhances student engagement and motivation. The application will feature quizzes and puzzles, which are well-suited for educational purposes due to their interactive and challenging nature. Quiz-based learning has been shown to be engaging and to enhance students' enthusiasm for learning [10].

The quiz games in this application will present questions related to Pancasila and Civic Education. These questions are designed to encourage students to recall and

apply their knowledge of Pancasila. The quizzes will not only help students remember important facts but also test their understanding of deeper concepts related to Pancasila and Civic. In addition to quizzes, the application will also feature puzzle games. The puzzle games will involve assembling images related to national symbols, historical events, and national figures. Assembling these images will not only provide hands-on learning experiences but also enhance students' cognitive skills. By solving puzzles, students will actively engage in the learning process, which can help improve their understanding of the material being taught.

Overall, this research aims to develop a game that can help improve the quality of Pancasila and Civic Education in Indonesia. By leveraging digital technology and a game-based learning approach, it is hoped that this game will make a significant contribution to enhancing students' understanding and appreciation of Pancasila and Civic values.

II. Literature Review

There have been numerous studies related to the research topic of designing a game-based learning support application. Some of these studies are as follows:

First, a study titled "Pendampingan Belajar Matematika Menggunakan Media Pembelajaran Berbasis Game Android" by Hidayah et al. (2022) aimed to increase students' interest in learning mathematics using Android-based game media so that students no longer view mathematics as a difficult and boring subject. This study found an increase in the percentage of students achieving scores above the Minimum Completeness Criteria (KKM) after the intervention, from 20% to 85%. This indicates that the use of Android-based game media for learning support can be considered successful [11].

The second study by Putri et al. (2019), titled "Rancang Bangun Aplikasi Pendukung Pembelajaran Ilmu Pengetahuan Sosial (IPS) Sekolah Dasar Berbasis Android," focuses on providing learning support through an application featuring text, images, videos, exercises or quizzes, and games. Quality testing of this learning application was conducted with 20 student respondents and three teacher respondents, with results showing that 62.5% of students and 62.75% of teachers strongly agreed with the application [12].

The third study, titled "Penggunaan Media Pembelajaran Berbasis Aplikasi Android pada Pembelajaran Teks Eksposisi" by Riyan (2021), aims to provide a variety of learning media for Indonesian language material on exposition texts. This application was developed to enhance the quality of Android-based learning applications used in schools, making them more engaging and effective [13].

The fourth study, titled "Langkah – Langkah Pengembangan Game Edukasi Berbasis SAC Materi Pancasila sebagai Nilai Kehidupan" by Melisa et al. (2024), discusses the development of educational games on Pancasila as life values. The material presented includes images, animations, and educational videos. The Pancasila educational game was tested with 20 students, resulting in a 95.17% rating of the application as very interesting [14].

The fifth study, titled "'SIMLA' Educational Game-Based Learning Media for the Inculcation of Pancasila Symbols and Principles, Augmenting Independent Character" by Rohmah et al. (2024), aims to develop a game-based learning media containing material on Pancasila symbols and principles for character strengthening. Based on testing with the Guttman scale, the material validation was 87.5%, media validation was 93.75%, user validation was 100%, and product testing was 100%. This indicates that the application is effective in enhancing students' character and abilities [15].

Previous studies have successfully demonstrated the efficacy of educational applications, producing positive results in various learning contexts. Building on this foundation, this research introduces a game called "Cerdas Pancasila." This game will feature both quiz and puzzle games, each with its own set of challenges and varying levels of difficulty. Players will progress through the game by completing each level, which is designed to be more challenging than previous levels. This structured difficulty progression aims to keep players engaged and motivated. In addition to the interactive gameplay, each level will provide detailed explanations for the questions and relevant images. These features are intended to enhance the educational value of the application by helping players better understand the material and improve their learning outcomes.

III. Research Method

The development of the "Cerdas Pancasila" application employs the Digital Game-Based Learning (DGBL) methodology. This approach is selected for its efficacy in merging educational content with interactive gaming elements, thereby enhancing both engagement and pedagogical effectiveness. The DGBL method is recognized for its ability to make learning contexts more relevant and comprehensible through a well-defined and organized development process [16].

Additionally, DGBL offers several distinct advantages that contribute to its effectiveness as an educational methodology. One of the primary benefits is its capacity to increase the relevance of learning experiences by integrating educational content into engaging game scenarios. This integration ensures that learning material is aligned with real-world contexts, making it more engaging and meaningful for learners.

The previous study that also used the DGBL method successfully implemented DGBL to design an application aimed at socializing Balinese traditional dress-up ethics [17]. This study demonstrated that DGBL is well-suited for developing educational applications, as it effectively engages users through interactive learning experiences while facilitating the acquisition of knowledge in a fun and immersive way.

The DGBL methodology encompasses several distinct phases, as detailed below:

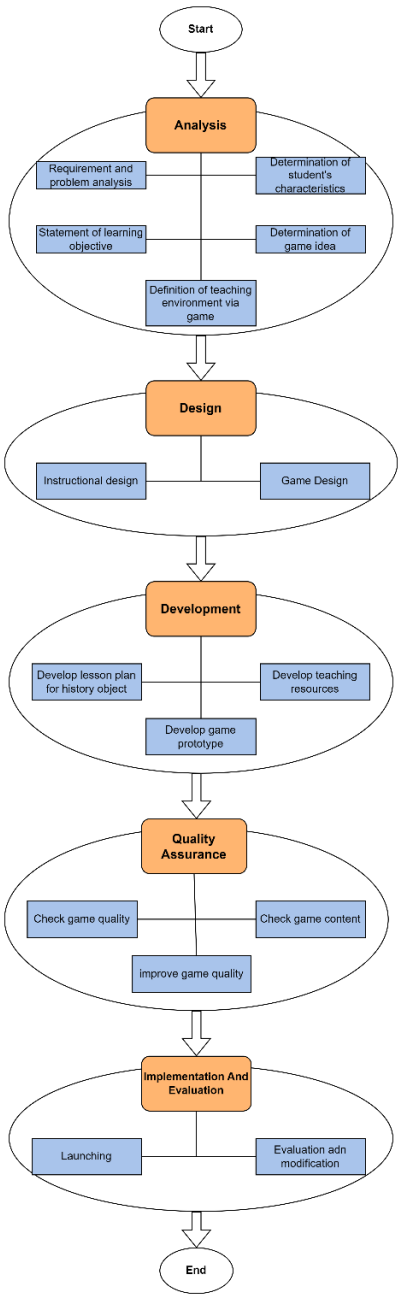

Fig. 1. Digital Game-Based Learning

Based on Fig. 1, the DGBL method consists of five phases :

1. Analysis Phase

This initial phase involves identifying the requirements and goals of the game, setting the foundation for the subsequent phases.

2. Design Phase

This stage outlines how the game will function and how users will interact with it.

3. Development Phase

This phase focuses on the actual creation of the game, including coding and content development. It involves implementing the design into a functional game using programming languages and tools.

4. Quality assurance

This phase involves thorough testing of the game to ensure it meets the required standards. It includes alpha testing, which focuses on verifying the game's functionality and feasibility, and beta testing, which involves end-users gathering feedback on their experience.

5. Implementation And Evaluation

The final phase involves distributing the game to the intended users and evaluating its effectiveness. This phase aims to assess how well the game meets user needs and identify any areas for improvement based on user feedback.

IV. Results And Implementation

A. Analysis Phase

A.1. Requirement and Problem Analysis

In this digital era, the need for interactive and engaging learning media is increasing, particularly in Pancasila and Civic Education subjects. The existing curriculum often lacks appeal to students, leading to low interest and understanding of the material. Therefore, educational media that can capture students' attention and enhance their understanding is needed. The Android-based game “Cerdas Pancasila” is designed to meet this need by offering educational and interactive quizzes and puzzles.

A.2. Determination of Students’ Characteristics

The game is specifically designed for elementary school students aged 9 to 12 years. Students in this age group are generally more responsive to interactive and game-based learning methods. The target student characteristics are those who are already familiar with mobile devices like smartphones or tablets, making the Android-based game easily accessible and usable for them.

A.3. Statement of Learning Objective

The goal of using the “Cerdas Pancasila” application is to enhance students' understanding of Pancasila values and basic Civic concepts. The game is designed to help students recognize and understand the principles of Pancasila, as well as how to apply them in everyday life. Additionally, the game aims to develop critical thinking and problem-solving skills through the quizzes and puzzles presented.

A.4. Determination of Game Idea

The fundamental idea of this game development is to combine educational elements with enjoyable gameplay. In this game, students will encounter quizzes that test their knowledge of Pancasila and Civic, as well as entertaining puzzles. Each level in the game is designed to progressively increase in difficulty, encouraging students to continue learning and strive to achieve higher scores.

A.5. Definition of Teaching Environment via Game

The learning environment created through this game is interactive and enjoyable, allowing students to learn while playing. The Android platform was chosen due to its widespread use and ease of access. With this game, students can learn anytime and anywhere using their mobile devices. The game is designed with an attractive and intuitive interface so students can easily understand and enjoy each challenge presented.

B. Design Phase

B.1. Instructional Design

The learning objectives intended to be achieved with this game are as follows:

1. To recognize and understand the values of Pancasila.
   This objective aims to ensure that players become familiar with the five principles of Pancasila, which are foundational to the Indonesian state philosophy. Through gameplay, users should be able to identify and comprehend the meaning and significance of each principle. The goal is to provide users with a clear understanding of Pancasila's values, such as belief in one God, humanitarianism, national unity, democracy, and social justice, so they can appreciate their role in the nation's identity and governance.
2. To understand rights and responsibilities as citizens.
   This objective focuses on educating players about their civic duties and rights within the framework of Pancasila. The game is designed to help users grasp what it means to be an active and responsible citizen, including the rights they are entitled to and the responsibilities they must uphold. The objective is to foster a sense of civic awareness and encourage behaviors that contribute to the welfare of the community and the nation as a whole.
3. To encourage the application of Pancasila values in daily life.
   The third objective goes beyond knowledge and understanding, aiming to influence players' actions and decisions in their everyday lives. By engaging with the game, users are encouraged to integrate the values of Pancasila into their daily activities, promoting ethical behavior, respect for diversity, and a commitment to social justice. The ultimate goal is to translate the philosophical principles of Pancasila into practical actions, fostering a society that embodies these values in real-life situations.

B.2. Game Design

The flow of the "Cerdas Pancasila" game application can be seen in the screenflow in Fig. 2.

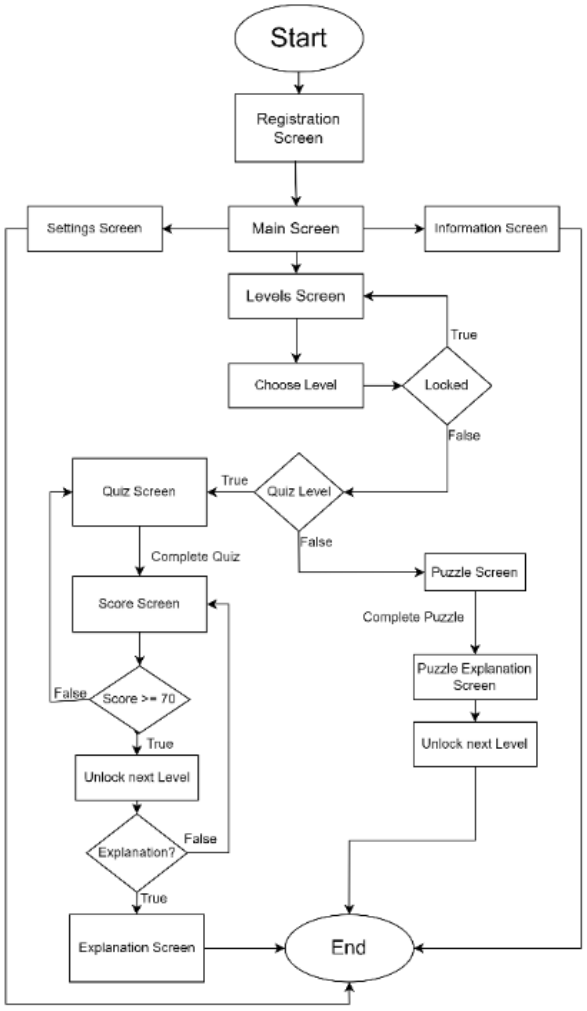

Fig. 2. Screenflow

Figure 2 shows the flow of the game. It starts with players registering their details on the registration screen, which then directs them to the main screen. From there, they can start the game, adjust settings, or view gameplay information. Upon starting the game, players access the levels screen, where they can unlock new levels by completing quizzes. After finishing a quiz, players see their scores and can view explanations for their answers. For puzzle levels, players solve puzzles to complete images and then receive detailed explanations about the images they've assembled

C. Development

C.1. Develop a Lesson Plan for the History Subject

Players are instructed to complete quizzes and puzzles related to Pancasila and Civic Education. Players will be provided with explanations related to the quizzes and puzzles they have completed.

C.2. Develop Teaching Resources

The development of the game is carried out using Android Studio with Kotlin and Java programming language.

C.3. Develop game prototype

The development of the game prototype involves creating an initial version of the application to illustrate its core functionality and features. The following figures show the prototypes of the game :

Fig. 3. Main screen and Registration screen

Figure 3 consists of the registration screen and the main screen. The registration screen is the first screen that appears when the application is launched for the first time. On this screen, players will be instructed to enter their name, age, and grade. After completing the registration, players will be navigated to the main screen. On the main screen, players can press the play button to start the game to navigate to the levels screen; players can also press the settings button to open the settings screen or select the information screen to navigate to the information screen to display the information on how to play the game.

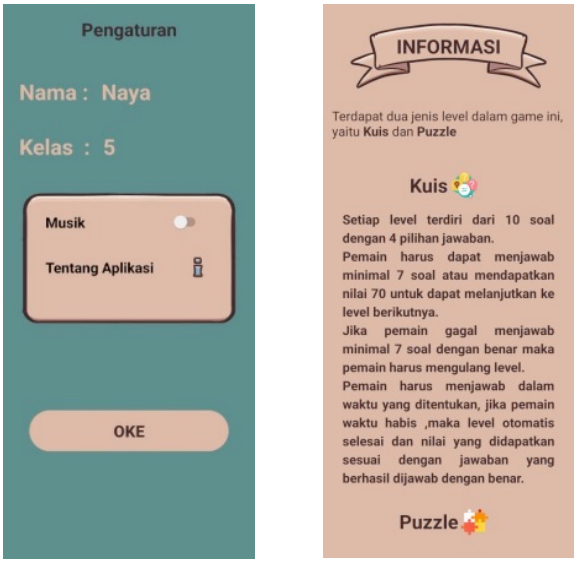

Fig. 4. Setting and Information screen

Figure 4 includes the settings screen and the information screen. The settings screen features a toggle switch to enable or disable the background music and a button providing details about the application. It also displays user information that was entered during the registration process. The information screen offers additional guidance or details about the game's features and functionalities.

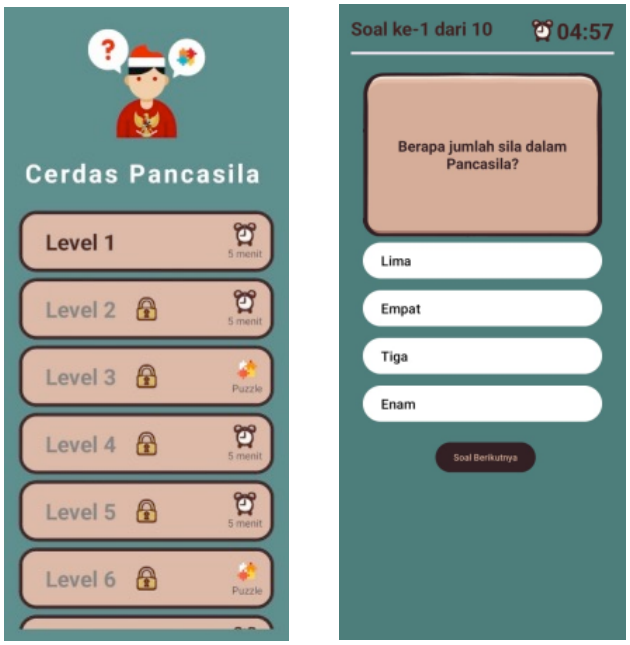

Fig. 5. Levels screen and quiz screen

Figure 5 consists of two screens: the level screen and the quiz screen. The level screen displays a list of all game levels, with only the first level accessible at the start. To unlock subsequent levels, players must complete the current level successfully. This system ensures a progressive challenge as players advance through the game. The quiz screen presents players with a series of questions and multiple-choice options. Players select their answers, and once an answer is chosen, they can move to the next question by tapping the "Next Question" button. To progress through the game, players must complete each quiz within the time limit, adding a dynamic element of urgency and engagement to the learning experience.

Figure 6 consists of two screens: the score screen and the explanation screen. Upon completing a quiz, players are directed to the score screen, where their performance is displayed based on the number of questions they answered correctly. The score is calculated to reflect the player's accuracy, and a score of at least 70% is required to advance to the next level. This scoring system ensures that players have a solid understanding of the material before moving forward. Additionally, the score screen includes an "Explanation" button, which players can press to access detailed explana

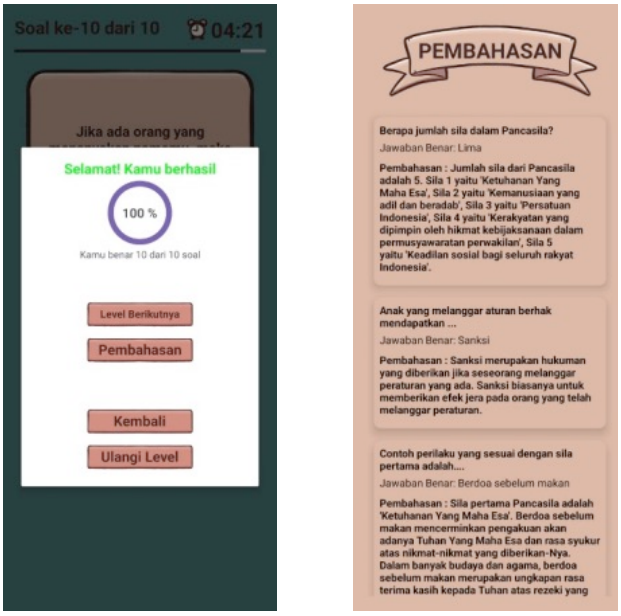

Fig. 6. Score and Explanation Screen

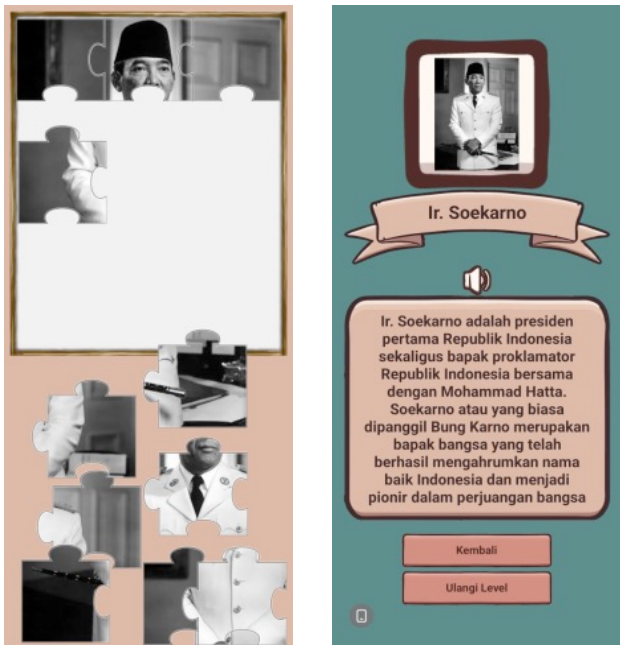

Fig. 7. Puzzle and image explanation screen

Figure 7 consists of two screens: the puzzle screen and the image explanation screen. On the puzzle screen, players will arrange pieces into a frame to complete a picture. The picture could be a national symbol, a historical event, or a national figure. The number of the puzzle pieces increases with higher levels, adding complexity to the puzzles. Once a puzzle is completed, players will be directed to the image explanation screen, where they receive detailed information about the image they assembled. The players can also press the speaker icon to listen to the explanation. This explanation provides context and educational insights, helping players understand the significance of the image and reinforcing the learning objectives of the game.

D. Quality Assurance

D.1. Check the game's quality

Alpha testing is conducted to ensure that the game functions correctly and meets the initial design specifications. This testing phase involves evaluating the application to identify and address any bugs or issues before it is released to external testers. Table I presents the results of alpha testing, which was conducted using the black box testing method. This approach focuses on testing the application's functionality without examining its internal code structure.

Table I . Alpha Testing

Test Class	Testing Scenario	Expected Result	Testing Result
Main Screen Selection	Select the play button	Showing all levels available	Success ✓ Failed
	Select the setting button.	Showing the player's detail and music toggle	Success ✓ Failed
	Select the information button.	Showing the information about the game	Success ✓ Failed
Level Selection	Try playing the first level	Display all levels	Success ✓ Failed
		Levels are locked except the first level	Success ✓ Failed
		Some levels are quiz, and some levels are puzzle	Success ✓ Failed
Playing the game	Playing the quiz level	Showing the question	Success ✓ Failed
	Select next button	Showing next question	Success ✓ Failed
	Select the previous button.	Showing the previous question	Success ✓ Failed
	Select done button	Showing score	Success ✓ Failed

Test Class	Testing Scenario	Expected Result	Testing Result
	Select the next or restart level button.	Starting the next level or restarting the current level	Success ✓ Failed
	Playing the puzzle level	Showing randomized puzzle pieces	Success ✓ Failed
	Complete puzzle image	Showing the explanation of the image	Success ✓ Failed
	Pressing the speaker button	Reading the explanation about the image	Success ✓ Failed

Overall, alpha testing confirms that the application is functioning as intended, with all key features working correctly and no major issues reported.

D.2. Check the game's content

After completing alpha testing, the next step is to conduct beta testing to directly evaluate the application with users and determine if it is well-received. Testing was carried out by providing a questionnaire to 18 elementary school student respondents aged 9 to 12 years.

This age group was chosen because they are at a developmental stage where they can effectively engage with the educational content, providing meaningful feedback on the usability and educational value of the application.

The questionnaire for student testing consists of 11 questions, namely:

1. How would you rate the appearance and design of this game?
2. How would you assess the gameplay of this game?
3. Is the language used in the application easy to understand?
4. Is the font used in the game easy to read?
5. How would you rate the color scheme of this game?
6. How do you feel about the quality of sound and music used in this game?
7. Do you find the game easy to play?
8. How informative is the Pancasila learning content in this game?
9. How well does the game explain the values of Pancasila?
10. Has the game increased your knowledge about Pancasila?
11. How satisfied are you with the game overall?

The results of the questionnaire are detailed in Table III, while the weight values assigned to each rating are listed in Table II with the rate start from very poor as the lowest and excellent as the highest.

Table II. Weight value

Rating	Weight Value
Excellent	5
Good	4
Fair	3
Poor	2
Very poor	1

Table III. Questionnaire result

Question	Weight Value					Number Of Respondents
	5	4	3	2	1	
1	12	4	0	2	0	18
2	9	9	0	0	0	18
3	10	5	3	0	0	18
4	13	5	0	0	0	18
5	10	8	0	0	0	18
6	7	11	0	0	0	18
7	10	6	2	0	0	18
8	11	7	0	0	0	18
9	12	5	1	0	0	18
10	8	9	1	0	0	18
11	10	8	0	0	0	18

The acceptance rate of the game can be calculated using the formula :

$$Acceptance\ rate = \left(\frac{total\ weighted\ score}{total\ possible\ score}\right) \times 100 \quad (1)$$

In this case, the total weighted score is 893, and the total possible score is 990. By substituting these values into the Eq. 1, we get:

$$Acceptance\ rate = \left(\frac{893}{990}\right) \times 100 = 90.2\% \quad (2)$$

Based on the results of the questionnaire, which was completed by 18 elementary school students, the game received an overall acceptance rate of 90.2%. This high percentage indicates that the majority of users found the application to be effective and satisfactory.

D.3. Improve the game's quality

According to the DGBL methodology, thorough testing is essential before an application is launched. Both alpha and beta testing for this study were completed successfully, with no significant issues found. The application received a positive response from users, achieving an acceptance rate of 90,2%. Based on these results, it can be concluded that the application is ready for launch.

E. Implementation and Evaluation

According to the DGBL methodology, this phase includes two stages: Launching and Evaluation. The researcher completed the launching stage by packaging the application in .apk format. However, the evaluation stage was not conducted, as the research only extended to the application packaging stage.

V. Conclusion and Suggestion

A. Conclusion

Based on the research conducted, the following results were obtained:

1. Pancasila and Civic Education can be effectively implemented into an Android game application.
2. The features provided in this application include a quiz game containing questions related to Pancasila and Civic Education, as well as a puzzle game presenting image assembly related to national symbols, historical events, and national figures.
3. Alpha testing indicates that the "Cerdas Pancasila" application is functioning as expected.
4. Beta testing shows that the application is well-received, with a positive acceptance rate of 90.2% from 18 respondents. Additionally, 17 respondents reported that the application helped enhance their knowledge about Pancasila and Civic Education.

B. Suggestion

1. Expand the variety of games beyond just quizzes and puzzles to include other engaging and educational game types.
2. Regular updates and maintenance of the application are essential to keep the content current, particularly with curriculum changes. These updates should also add new levels and challenges to keep players engaged.

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