

# Application of Multimedia Learning for Pancasila and Citizenship Education in SD Inpres Waingapu 3

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## Abstract

PPKn is an essential subject in elementary schools to instill Pancasila values and national identity. However, the results of the End-of-Semester Assessment (PAS) at SD Inpres Waingapu 3 consistently show low PPKn scores. To address this issue, this study developed a multimedia learning application for PPKn. This application is designed to enhance student understanding of PPKn material, particularly related to Pancasila values. The SDLC (Software Development Life Cycle) Waterfall method was used in the application's development. The application's effectiveness was tested through pre-test and post-test, showing a significant increase in the average score of 79.5%. The application's usability was also tested using the System Usability Scale (SUS), with an average score of 85 and a category of "Excellent". These results indicate that the PPKn multimedia learning application is effective and ready for use in elementary schools. hopefully this application can help improve the quality of PPKn learning and instill Pancasila values more strongly in students.

**Keywords:** Education Multimedia, SDLC, Waterfall, Unity, PPKn

## 1. Introduction

Technology plays a pivotal role in today's modern era. The rapid advancements in computer devices and applications across various fields demand special attention, particularly in the education sector. The demands of globalization, coupled with the development of information technology, can be harnessed by various parties to achieve specific goals, such as education. The utilization of technology in education significantly contributes to enhancing the quality of education that an institution aims to achieve. One aspect of technology utilization in education is in the learning process of students, both inside and outside the classroom. SD Inpres Waingapu 3 is one of the educational units with an elementary school level in Kambajawa, Kec. Kota Waingapu, Kab. Sumba Timur, Nusa Tenggara Timur. The learning process at SD Inpres Waingapu 3 still uses the 2013 Curriculum. The learning process is carried out by teachers creating presentation files and then teaching in the classroom using lecture, question-and-answer, and 5M (Mendengar, Meniru, Mencoba, Mengulangi, Menghayati) methods. SD Inpres Waingapu 3 conducts the Semester Final Assessment (PAS) at the end of the semester, focusing on four themes: 1, 2, 3, and 4. The analysis of the PAS results for Grade 3 in the 2023/2024 academic year shows that the overall PPKn scores are relatively low, especially in Theme 2 "Loving Plants and Animals" and Theme 3 "Objects Around Me." This requires attention and efforts beyond the Semester Final Assessment. The average scores for themes 2 and 3 out of 4 themes are low, where the average score for theme 2 is 75.5 and theme 3 is 75.6. The importance of PPKn learning is explained in Law No. 20 of 2003 concerning the National Education System, Chapter 10 on the curriculum, Article 37 Paragraphs 1 and 2, which explains that PPKn is one of the compulsory subjects in the elementary, secondary, and higher education curriculum (Law No. 20 of 2003) [1]. Therefore, to overcome this problem, the researcher has created a multimedia learning application related to PPKn that contains PPKn material to improve the understanding of students at Inpres Waingapu 3 Elementary School.

This application can also help teachers teach the material in an interesting and interactive way. The curriculum serves as a guideline for implementing educational activities in schools for all stakeholders, including teachers, principals, supervisors, parents, the community, and students themselves [2]. The implementation of the 2013 Curriculum has presented challenges compared to previous curricula. These challenges include the use of teaching materials, the complexity of assessment, and the effectiveness of teaching methods. The 2013 Curriculum emphasizes teachers' ability to implement authentic, challenging, and meaningful learning processes for students to develop their full potential in alignment with national education goals. However, many teachers still face difficulties in implementing the 2013 Curriculum effectively. Civic Education (PPKn) is an integral part of the national education system, integrated from elementary school to university [3]. Its purpose is to achieve the national education goal of producing a younger generation with strong character and a love for their country. PPKn learning is designed, developed, implemented, and evaluated based on national education goals. PPKn serves as a fundamental foundation and mindset for building a younger generation ready to contribute to national development. PPKn goes beyond theoretical understanding; it emphasizes the application of Pancasila values in daily life. Therefore, the PPKn learning process should empower and enculturate students to become responsible citizens.

Effective PPKn learning should focus on application, encouraging students to not only understand Pancasila values but also apply them in daily life through various activities [4]. Technology can be utilized to make PPKn learning more engaging and interactive, involving various stakeholders, including parents and the community, to support the inculcation of Pancasila values and positive character traits in students. Multimedia is a combination of media elements such as text, images, sounds, videos, and animations. It can be presented through computers or digital devices and has two meanings: a combination of computers and videos or a combination of three elements (sound, images, text). It can be a combination of two media input or output data audio (sound and music). Learning is the process of transferring knowledge and information from an expert to others. Its purpose is to improve the recipient's knowledge and skills and requires interaction between the teacher and the learner [5]. Unity is one of the easiest game engines to use for creating objects and giving them functions to run. The Unity Game Engine is developed by Unity Technologies Industry and is a set of code used to create functions in games [6]. Unity can run on multiple operating systems such as Android OS, iOS, Linux OS, and Microsoft OS. Unity has 3 programming languages used for scripting: C#, JavaScript, and Python. C# is a computer programming language that uses a class library. C# is an object-oriented language that allows developers to build a variety of secure and powerful applications that run on the .NET Framework [7], which was introduced by Microsoft in January 1999 and released in 2000. So, C# is a programming language that uses a class library in the .NET Framework which means a function must be defined in a class. As an object-oriented language, C# supports the concepts of encapsulation, inheritance, and polymorphism. All variables and methods, including the main method, application entry point are encapsulated in the class definition [8]. The Waterfall model is one of the System Development Life Cycle (SDLC) models that is often used in the development of information systems or software.

This model is often referred to as waterfall modeling because its development uses a systematic and sequential approach so that each stage will be completed systematically and cannot skip stages. The stages in this model start from the analysis, design, implementation, testing to the management (maintenance) stage and are carried out gradually or sequentially. The stages in the Waterfall method can be seen in the following figure: This stage is the initial stage in the development of an application, this stage is used to find out information from the system that is needed, both functional and non-functional requirements. At this stage, application developers need communication to understand the software expected by users and the limitations of the software. Information can be gathered through interviews, discussions, or direct survey. This stage aims to create a design from the results of the analysis carried out in the previous stage. Application design is in the form of interface design and storyboard of a system or software. At this stage, the application of the previous stage is carried out into the coding or program writing process. So that you get data that can be transformed into the game application. At this stage, the system is verified and tested to see if the software that is developed fully or partially meets the requirements. Testing is done to determine whether the application that has been created is in accordance with the requirements or not. Testing can be categorized into unit testing, system testing (to see how the application reacts when all integrated modules), and acceptance testing (done with or by the customer's name to see if all customer's needs are satisfied). So, in testing, it can be observed whether the system is running well, and the interface display produced is in accordance with expectations. Maintenance is the final stage of the Waterfall method [9]. The software that has been made is run and maintained. Maintenance is in the form of fixing application errors and improving the system to meet new user needs. Black box testing is a method for testing the functionality of an application or software. Black box testing includes testing the user interface, input, and output of an application. Application testing aims to assess whether the software that has been developed meets user needs. Through application testing, data or input will be obtained which is given for functional assessment without seeing the process of obtaining the output. From the output produced, the capabilities of the program that has been created in meeting user needs can be known and the errors that exist can be easily identified [10].

## 2. Research Methodology

SD Inpres Waingapu 3 is one of the primary schools in Sumba Timur Regency, East Nusa Tenggara Province, Indonesia. It operates under the Ministry of Education and Culture and provides a conducive learning environment for its students. SD Inpres Waingapu 3 implements a six-day school week, with classes starting in the morning and ending in the afternoon. For Grade 3, the school follows the K13 curriculum and uses textbooks titled "Theme 2: Loving Plants and Animals" and "Theme 3: Objects Around Me." These textbooks cover three subjects: Civic Education (PPKn), Indonesian Language, and Mathematics. The results of the Final Semester Assessment (PAS) in 2023 revealed that Grade 3 students at SD Inpres Waingapu 3 still have relatively low scores, particularly in Civic Education (PPKn). The current teaching methods for PPKn involve lectures and question-and-answer sessions, which may not be fully effective in engaging students and promoting deeper understanding of the subject matter. To address these challenges, this study aims to develop and implement a multimedia learning application for Civic Education (PPKn) in Grade 3 at Inpres Waingapu 3 Elementary School.

The research will follow a hierarchical approach, as outlined in Figure 1: **Data Collection:** Gather data on Teaching materials and methods. **Multimedia Learning Application Development:** Design and develop a multimedia learning application for Civic Education (PPKn) that incorporates interactive and engaging elements testing and **Analysis:** Evaluate the effectiveness of the multimedia learning application through testing and analysis of student performance and engagement. The implementation of the multimedia learning application for Civic Education (PPKn) is expected to: Improve student understanding and engagement in Civic Education (PPKn) lessons. Enhance the overall quality of teaching and learning in Civic Education (PPKn). Contribute to the development of effective and innovative teaching methods for Civic Education (PPKn) in elementary schools. This study seeks to address the challenges of low student achievement in Civic Education (PPKn) at SD Inpres Waingapu 3 by developing and implementing a multimedia learning application. The findings of this study are expected to provide valuable insights into the effectiveness of multimedia learning in promoting deeper understanding and engagement in Civic Education (PPKn) among elementary school students.

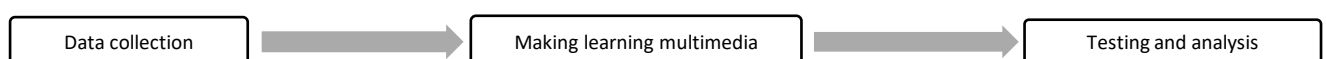


Fig. 1: Research Flow

The research methodology for this study is outlined in Figure 1, which summarizes the key steps involved in data collection, multimedia learning application development, and testing and analysis. The initial stage of the research involves data collection, which aims to gather

information to support and address the identified problem. Data gathering conducted by interviewing the 3rd Grade teacher, Hendrikus Elias Sawi, S.Pd., and the school principal, Hamuli Ngguna Manggil, S.Pd., at Inpres Waingapu 3 Elementary School. These interviews aimed to gather insights into the current teaching practices, student needs, and challenges related to Civic Education (PPKn) instruction. Observation: Classroom observations were conducted to observe the teacher's instructional methods, particularly their approach to explaining concepts, delivering assessments, and conducting exams. The development of the multimedia learning application follows the Waterfall model, a systematic and structured approach that involves sequential phases: Analysis: This phase involves a thorough analysis of the data collected from interviews, observations, and document reviews. The analysis aims to identify the specific learning objectives, target audience characteristics, and instructional needs that the application should address. Design: This phase focuses on designing the overall structure and user interface of the application.

The design includes creating wireframes, storyboards, and mockups to visualize the application's layout, navigation, and interactive elements. Implementation: This phase involves the actual coding and development of the application using appropriate programming languages and tools. The application should incorporate the design elements, instructional content, and interactive activities identified in the previous phases. Testing: This phase involves rigorous testing of the application to ensure its functionality, usability, and effectiveness in achieving the learning objectives. Testing methods may include user testing, bug fixing, and performance evaluation. Maintenance: This phase involves ongoing maintenance and support of the application to address any issues that arise, update content, and adapt to changing requirements. Figure 2 presents a hierarchical structure that outlines the overall flow of activities within the multimedia learning application for Civic Education (PPKn). The application will consist of several main sections: Main Menu: The main menu provides users with options to access different sections of the application, such as the learning module, game module, and settings. Learning Module: The learning module presents instructional content in an engaging and interactive format. It may include multimedia elements such as videos, animations, and interactive exercises to promote deeper understanding of Civic Education (PPKn) concepts. Game Module: The game module incorporates gamification elements to make learning more fun and engaging. The game may involve interactive challenges, rewards, and leaderboards to motivate students and reinforce learning outcomes. Settings: The settings section allows users to customize the application's preferences, such as language, audio volume, and accessibility options. The research methodology outlined in this section provides a structured approach to data collection, multimedia learning application development, and evaluation. The application is designed to address the identified challenges in Civic Education (PPKn) instruction at SD Inpres Waingapu 3 by incorporating interactive and engaging learning activities that align with the curriculum and instructional objectives. The evaluation process will ensure the application's effectiveness in promoting student understanding, engagement, and overall learning outcomes.

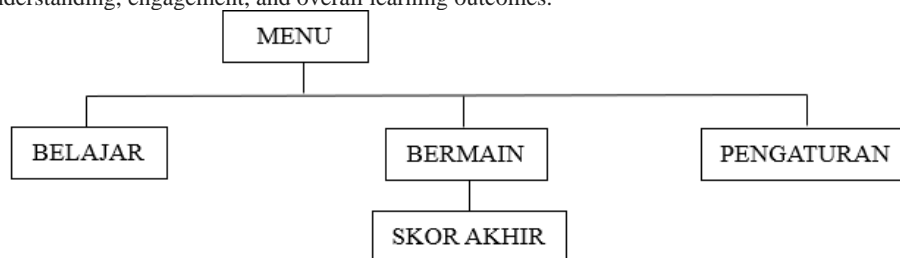


Fig. 2: Hirarki Menu Game

The main menu is the initial screen that presents users with options to navigate the game. It serves as a gateway to the various features and activities offered within the game. The main menu typically features two primary options: Learn: This option directs users to the learning module, where they can engage with interactive and informative content related to Civic Education (PPKn). The learning module may include multimedia elements such as videos, animations, and interactive exercises to enhance understanding and retention of key concepts. Play: This option leads users to the game module, where they can participate in engaging and interactive games designed to reinforce their knowledge of Civic Education (PPKn). The game module may incorporate gamification elements such as challenges, rewards, and leaderboards to motivate players and make learning more enjoyable. Users can interact with the main menu by selecting the desired option using input methods such as buttons, touchscreens, or voice commands. Upon selecting an option, the game transitions to the corresponding module (learning or game) to allow users to explore the selected activity. The main menu plays a crucial role in guiding users through the game's functionalities and providing a structured approach to learning and engaging with Civic Education (PPKn) content. It serves as a central hub for users to access the educational resources and interactive activities offered within the game.

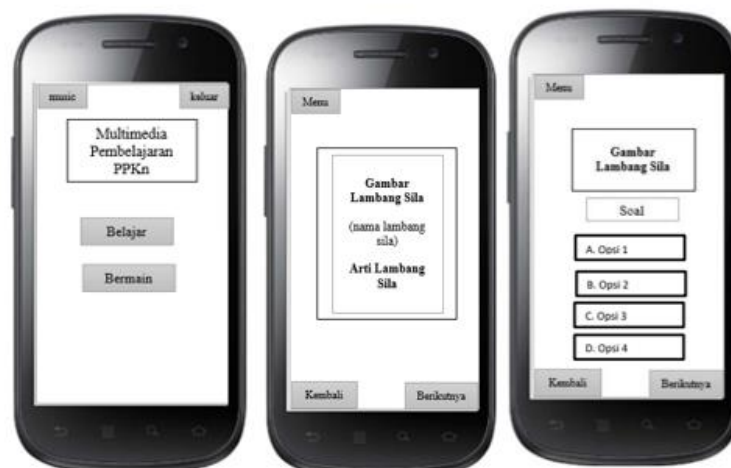


Fig. 3: Main Menu

### 3. Testing and Analysis

Before starting the game development process, the researcher will prepare the necessary images that will be used throughout the game. These images may include backgrounds, characters, objects, and game elements. Once the images are ready, the researcher will proceed to create the individual scenes or levels of the game. Each scene will have its own layout, elements, and interactions. The researcher will design the main menu, submenus, and game buttons. These elements should be visually appealing, easy to understand, and consistent with the overall game theme. Once the assets and designs are finalized, the researcher will start coding the game. This involves writing the programming code that brings the game to life, including game logic, interactions, animations, and sound effects. Before releasing the game to users, it is crucial to conduct thorough testing to ensure that all features and functionalities are working as intended. This involves using black-box testing, which focuses on the input and output of the game without examining the internal code. The goal is to identify any bugs or discrepancies between the expected behavior and the actual performance of the game. Dividing the test cases into groups based on similar input values and expected outcomes. Testing the game at the edges or limits of its input range to ensure it handles extreme values correctly. Creating a table that outlines all possible input combinations and their corresponding expected outcomes. Testing the game's transitions between different states or levels to ensure smooth and consistent behavior. Usability testing aims to evaluate the user-friendliness and overall experience of the game.

This involves recruiting a group of potential users and having them interact with the game to identify any usability issues or areas for improvement. Observing users as they play the game and asking them to verbalize their thoughts and actions. Using established usability principles to evaluate the game's design and functionality. Asking users to complete questionnaires after playing the game to gather feedback on their experience. Game development doesn't end with the release of the product. Ongoing maintenance is essential to ensure the game's long-term performance, security, and relevance. This includes identifying and addressing any bugs or glitches that may arise in the game. Monitoring and optimizing the game's performance to ensure smooth gameplay on various devices. Adding new content, features, or levels to keep the game engaging and relevant. Effective distribution makes the game easily accessible to its target audience. This involves: Choosing appropriate platforms for distribution, such as app stores, websites, or educational portals. Streamlining the installation process to make it easy for users to download and install the game. Ensuring that users can easily receive updates and patches to keep the game up-to-date and secure. To assess the effectiveness of the game in promoting student learning, two types of evaluations will be conducted: Before using the game, students will take a pre-test to assess their baseline knowledge of Civic Education (PPKn) concepts. After using the game for a designated period, students will take a post-test to measure their understanding of the concepts covered in the game. System Usability Scale (SUS) is used to evaluate the game's usability. This involves administering a questionnaire to a group of teachers to gather feedback on the game's ease of use, learnability, and overall effectiveness. Building upon the design phase, the next step involves implementing the game's functionalities and features.

This section outlines the implementation process for the Android-based Pancasila and Citizenship Education multimedia game. It presents the initial screen that greets users upon launching the Pancasila and Citizenship Education multimedia game. The main menu features two primary options: Learn: This option directs users to the learning module, where they can engage with interactive and informative content related to Pancasila and Citizenship Education. The learning module may include multimedia elements such as videos, animations, and interactive exercises to enhance understanding and retention of key concepts. Play: This option leads users to the game module, where they can participate in engaging and interactive games designed to reinforce their knowledge of Pancasila and Citizenship Education. The game module may incorporate gamification elements such as challenges, rewards, and leaderboards to motivate players and make learning more enjoyable. The implementation process involves: Coding: Writing the programming code that brings the game to life, including game logic, interactions, animations, sound effects, and user interface elements. Asset Integration: Incorporating the prepared images, sounds, and other assets into the game code. Testing and Debugging: Rigorously testing the game to identify and fix any bugs or issues. Performance Optimization: Ensuring the game runs smoothly and efficiently on various Android devices. The implementation phase brings the game's design to life, transforming the conceptual ideas and visual elements into a functional and engaging learning experience for users. Through careful coding, asset integration, testing, and optimization, the game will be ready to be distributed and utilized by students to enhance their understanding of Pancasila and Citizenship Education.



Figure 4: User Interface in Game Results

When a user selects the "Learn" option from the main menu, Figure 4 appears on their mobile device screen. This page presents a description of the Civic Education Multimedia Learning module, providing an overview of the learning material and its objectives. **Visual Learning:** Each topic is accompanied by a corresponding image that serves as a visual representation of the concept being taught. **Textual Explanations:** Clear and concise text explanations accompany each image, providing detailed information about the topic. **Interactive Assessment:** Users can engage in interactive assessments by selecting the correct answer from a set of options. **Completion Tracking:** The module tracks the user's progress through the learning material, ensuring they cover all the topics before proceeding to the game module. Upon completing the "Learn" module, users are automatically directed back to the main menu, allowing them to either continue learning or start playing the game. The "Play" button on the main menu leads users to the game module, where they participate in interactive and engaging games to reinforce their understanding of Civic Education concepts. **Question Format:** The game presents users with a series of multiple-choice questions related to the topics covered in the "Learn" module. **Number of Questions:** Each game session consists of 10 questions. **Answer Options:** Each question offers four answer options (A, B, C, and D).

**Scoring System:** Correct Answer: A correct answer awards the user 10 points. Incorrect Answer: An incorrect answer does not affect the user's score. The correct answer is displayed for learning purposes. **Time Limit:** Users have 3 minutes to answer all 10 questions. **Game Over:** If the time limit expires before all questions are answered, the game ends, and the user's score is displayed. Figure 4 presents the game over screen, which appears when a user fails to complete the game within the time limit. It displays the user's final score and provides an opportunity to retry the game. The Civic Education Multimedia Learning game was evaluated using three testing methods:

Table 1: Black Box Testing Results

No	Activity	Expected Outcome	Information	
			Succeed	Fail
1	Run the game on Android	The game should run smoothly.	√	
2	Press the background music button (on/off)	Music on should play music. Music off should mute the music.	√	
3	Press the exit button	Exit the game application.	√	
4	Run the learning menu	The animal learning page should appear.	√	
5	Play audio	Indonesian language audio should be audible.	√	
6	Press the next button	Successfully displays the next page.	√	
5	Press the previous button	Successfully displays the previous page.	√	
6	Press the back button	Return to the main menu.	√	
7	Run the game menu	Displays the game page and questions are displayed.	√	
8	Select answer options in the game	Correct answers increase the score, wrong answers keep the score the same and the question continues. The score page appears.	√	
9	Press the button play again	Display game again	√	

**Black-box Testing:** This method focuses on testing the game's functionalities and features without examining the internal code. **Pre-test and Post-test:** This method assesses the change in student knowledge before and after playing the game to measure its effectiveness. **System Usability Scale (SUS):** This method evaluates the game's usability and overall user experience. the implementation of the learning and game modules provides a comprehensive and engaging learning experience for users. The "Learn" module offers a structured approach to understanding Civic Education concepts, while the "Play" module reinforces learning through interactive games. The combination of these elements, along with rigorous testing and evaluation, ensures that the game effectively promotes student learning and understanding of Civic Education. As presented, the total score for the 7 respondents is 598. To determine the average score, this total value is divided by the number of respondents:

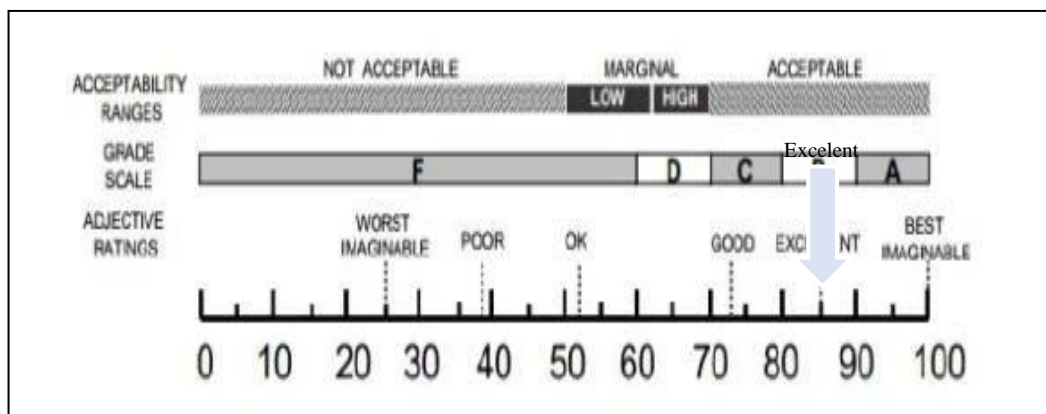


Fig. 5: SUS Score

Based on the average score of 85 obtained from the evaluation of the Pancasila and Citizenship Education multimedia learning game respondents, the game falls into the "acceptable" category. This corresponds to a grade of "B" on the grading scale and an "excellent" rating in terms of adjective ratings. Considering the positive average score, grade, and adjective rating, it can be concluded that the Pancasila and Citizenship Education multimedia learning game is of excellent quality and suitable for use by end-users. The game effectively conveys

the intended learning objectives and provides an engaging and interactive learning experience for users. The positive evaluation results support the continued development and implementation of the Pancasila and Citizenship Education multimedia learning game. It can be confidently deployed as a valuable tool for promoting civic education among students.

## 4. Conclusions

Based on conducted black box testing, all features in multimedia learning application were functioning properly. The pre-test and post-test results demonstrate a significant improvement in student understanding, with an average pre-test score of 49 and an average post-test score of 88. This represents a remarkable 79.5% increase in student performance. The System Usability Scale (SUS) evaluation yielded an average score of 85, corresponding to a grade of "B" and an "excellent" adjective rating. These positive results indicate that the game provides a user-friendly and enjoyable experience for players. Based on the comprehensive testing and evaluation, it can be concluded that the Pancasila and Citizenship Education Multimedia Learning Game for Inpres Waingapu Elementary School is both effective and user-friendly. The game successfully enhances student understanding of the subject matter while providing an engaging and interactive learning experience. Building upon the positive outcomes of this research, the following recommendations are proposed for future studies: **Expand Learning Content:** Consider incorporating additional learning materials and activities into the game to cover a wider range of Pancasila and Citizenship Education concepts. **Introduce New Game Mechanics:** Explore the introduction of new game mechanics or elements to further enhance engagement and motivation among players. **Address Usability Issues:** Continuously gather user feedback and address any identified usability issues to refine the game and improve the overall user Experience. **conduct Long-Term Studies:** Conduct longitudinal studies to assess the long-term impact of the game on student learning and engagement. **explore Cross-Cultural Adaptation:** Investigate the potential for adapting the game to suit different cultural contexts and educational settings. By incorporating these recommendations into future research endeavors, the Pancasila and Citizenship Education Multimedia Learning Game can be further developed and refined to maximize its effectiveness and impact in promoting civic education among students.

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