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Development of Mobile Gamification App for Engaging English Vocabulary in Grade 9 Students at Ampayon National High School

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Abstract: *This study introduces Augustus Word Odyssey, a mobile app designed to help Grade 9 students at Ampayon National High School improve their English vocabulary through gamified learning. The app features word puzzles, image-based guessing games, and crosswords using vocabulary from Romeo and Juliet to boost comprehension and retention. User testing showed increased engagement, better vocabulary recall, and a more positive attitude toward English learning. Students responded favorably, reporting greater interest in new words and improved understanding of literary texts. The study highlights gamification's potential in addressing vocabulary challenges and enhancing motivation, with applications for other literary works and academic subjects.*

Keywords: Gamification, Mobile Learning, Vocabulary Development, Literature Comprehension

1. INTRODUCTION

The integration of technology and gamification in education has significantly improved student engagement and learning outcomes, particularly in language acquisition [1,2]. Gamification, defined as the application of game elements in non-game contexts, has been shown to boost motivation, vocabulary acquisition, and overall English proficiency by fostering interactive and immersive learning experiences [3,4,5]. In the Philippines, many Grade 9 students at Ampayon National High School in Butuan City face challenges in learning English, especially in vocabulary and reading comprehension, with over 66% reporting high levels of difficulty [6]. To address this, researchers developed an Android-based gamified word puzzle app aligned with the English curriculum, providing vocabulary explanations and interactive features to make learning more engaging and [7,8]. This initiative aims to improve students' language skills and academic performance while offering insights for future curriculum development and educational technology integration [9,10].

2. STATEMENT OF THE PROBLEM

The statement of the problem outlines the main challenges that the study aims to address. It summarizes the problems that the study seeks to investigate and find solutions for. The specific of the problem is as follows:

- English literature students in Grade 9 at Ampayon National High School, Butuan City, face challenges in English proficiency, particularly in vocabulary usage.
- There is a lack of comprehensive word explanations and alignment of vocabulary instruction with relevant topics from the English curriculum, further affecting students' proficiency in English. [11].

3. OBJECTIVE OF THE STUDY

The objective of this study is to develop a platform that helps students enhance their vocabulary. The specific objectives are as follows.

- Design and develop a mobile application with interactive features that facilitate vocabulary enhancement through engaging activities such as word-guessing games, crossword puzzles, and contextual word usage aligned with the Grade 9 English syllabus.
- Incorporate gamification elements and implement a comprehensive word explanation approach aligned with the English curriculum.
- Test the application's usability through user feedback during implementation.

4. SIGNIFICANCE OF THE STUDY

The significance of the study extends to various stakeholders involved in the educational process, including students, schools, and teachers. The study holds the following significance for each group.

- a) **Students.** This study is important for students as it enhances their vocabulary and language skills through fun, game-based learning. Using games makes English more engaging and motivates students, helping them better understand and enjoy reading.
- b) **Teachers.** This study benefits teachers by providing effective methods to teach new vocabulary aligned with the curriculum, helping students better understand unfamiliar words. It supports regular teaching, makes story discussions easier, and enhances student interest in literature, giving teachers a greater sense of success.
- c) **Schools.** This study is important to schools as it shows that using game-based learning can effectively improve students' vocabulary. It aligns with modern teaching methods, creates a fun learning environment, and demonstrates the school's commitment to student success. This approach can boost student performance and enhance the school's reputation and ranking.

5. SCOPE AND LIMITATION OF THE STUDY

This study focuses on 50 Grade 9 students from two sections at Ampayon National High School in Butuan

City. Its goal is to help students improve their vocabulary and language skills using fun and creative methods. The focus is on vocabulary from Acts 1 to 4 of *Romeo and Juliet*. To make learning more engaging, the study uses gamification such as image-based guessing games and crossword puzzles. The app is designed to work offline, allowing students to learn anytime, even without internet access. Students learn in different ways, which may affect how they use and enjoy the app. The app is only available on Android devices, students with iOS or other unsupported phones may not be able to use it. React Native and SQLite are excellent for creating offline apps, they might not work as smoothly on older or low-end devices. The app only covers vocabulary from *Romeo and Juliet* and does not include words from other literary works. This could limit the students' overall vocabulary development.

6. THEORETICAL FRAMEWORK

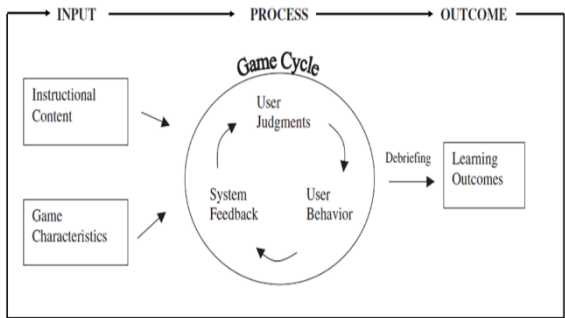


Fig. 1. Input-process-output model

This study adapted by Ishak [12] proposed a model illustrating the input-process-output structure, which emphasizes the role of instructional content and game characteristics as inputs, the game cycle as the process involving user judgments, system feedback, and behavior, and learning outcomes as the result after debriefing. Digital games provide learners with a graphical system of interaction that enhances scientific concepts within an enjoyable environment. The studies on gaming and learning have 3 major and distinct perspectives (1) research on input: how to develop educational digital games; (2) research on process: how the games work for users; and (3) research on outcome: impact of the games. Advancing gaming technology means the number of digital games keeps increasing, and developers are competing with each other. These collaborations lead to an agile form of development that requires multiple lightweight processes over a shorter period. This makes it easier for each game designer, game developer, and STEM expert to ensure the digital game undergoes a systematic development process suitable for STEM digital game-based learning. [12].

7. GAMIFICATION IN EDUCATION

Gamification has been widely used to design better educational systems aiming to increase students' concentration, motivation, engagement, flow experience and other positive experiences. According to [13] Gamification can be implemented through various strategies, such as incorporating game based activities, simulations, virtual rewards, and progress tracking systems into educational platforms. According to the study of Does Gamification in Education Work? By Araya [14] That there are negative sides of applying

gamification in education because the study shows that the program generated increases in math anxiety and reduced students' preference to engage in teamwork.

8. K TO 12 BASIC EDUCATION CURRICULUM

The K to 12 Basic Education Curriculum for English provides a comprehensive framework to enhance learners' communicative competence and appreciation for literature. Specifically, the Grade 9 syllabus integrates Philippine, British, and American literature, promoting cultural understanding and critical thinking. According to the (K to 12 Curriculum Guide), the program standard focuses on engaging students with various text types, encouraging deeper connections with Philippine and global cultures. The grade-level standard emphasizes British-American literature's role in enhancing students' skills, including the use of effective language and the integration of cultural insights. The content standard specifies the importance of Anglo-American literature. Vocabulary enhancement, grammar accuracy, and understanding word formation are also prioritized. These require mastery of verbal and non-verbal communication strategies, evaluated based on focus, voice, delivery, facial expressions, gestures, and audience engagement. The syllabus organizes learning competencies into the following categories: [15].

Table 1. K to 12 English Syllabus for Grade 9.

	Reading Comprehension	Listening Comprehension	Viewing Comprehension	Vocabulary Development	Literature	Writing and Composition	Oral Language and Fluency	Grammar Awareness
Week 1-10	Focused on analyzing themes and ideas in literary texts.	Developing skills to understand spoken literature and discourse.	Encouraging interpretation of visual media.	Expanding word knowledge and derivation strategies.	Highlighting cultural and thematic connections in texts.	Refining creative and analytical writing skills.	Enhancing public speaking and expression.	Focusing on proper language usage and structure.

9. DEVELOPMENT TECHNOLOGIES

The development of mobile educational applications has increasingly relied on modern programming languages and frameworks to enhance learner engagement and improve learning outcomes. JavaScript, recognized for its dynamic and event-driven features, plays a central role in creating interactive learning environments. According to [16] React Native, a mobile application framework built on JavaScript and developed by Facebook, was chosen for its cross-platform capabilities. This framework allows developers to write a shared codebase for both Android and iOS applications, reducing development time and cost [17]. Fithriani [18] states that asynchronous systems like Node.js are effective in supporting real-time communication and user tracking, which are important in gamified applications for storing scores and tracking vocabulary progress. SQLite, a lightweight and embedded relational database management system (RDBMS), was integrated for local data storage within the mobile application. Its serverless design and offline capabilities make it particularly suitable for educational apps used in areas with limited internet connectivity [19].

10. METHODOLOGY

Conceptual framework of the Literature Game System, which integrates story-based learning with gamified vocabulary tasks. It uses tools such as Visual Studio Code, JavaScript, React Native, Node.js, and SQLite to support interactive gameplay and offline learning. The system follows a continuous cycle of development, testing, and updates, with outcomes measured by user engagement, motivation, and vocabulary improvement.

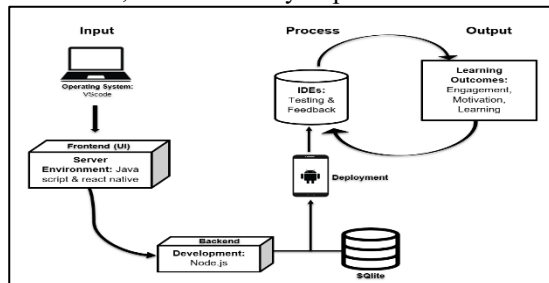


Fig. 2. Conceptual Framework

11. SYSTEM ARCHITECTURE

The app designed to provide a flexible, game-based vocabulary learning experience for Grade 9 students. Built with React Native, the mobile app features two main games: Word Puzzle and Crossword Puzzle. These games utilize a local SQLite database to store vocabulary words, meanings, and examples, ensuring offline access. The backend, developed with Node.js, processes the game logic, manages user progress, and ensures a smooth and efficient learning experience.

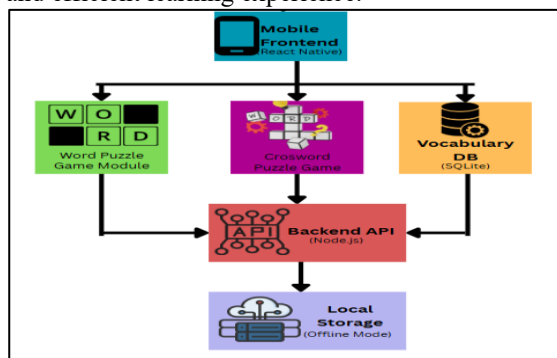


Fig. 3. System Architecture

12. MOBILE REQUIREMENTS

The researchers outline the requirements for the development of the word puzzle game, a captivating and interactive application that challenges players to guess words based on images.

12.1 Software Requirements

Table 2. Software Requirements (for development)

Software	Specification
Operating System	Windows 10 and above versions
Programming Language	Javascript
Framework/Library	React Native,
Database	Nodejs
IDEs	Sqlite
	Visual Studio, Android Studio

12.2 Hardware Requirements

Table 3. Hardware Requirements (for development)

Hardware	Specification
Processor	Intel Core i5 or equivalent
Storage	8 GB or Higher

12.3 Android Requirements

Table 4. Android Requirements (for App deployment & Installation)

Android	Specification
Ram	4gb Ram
Android Version	8.0+
Storage	8 GB or Higher

For the development of the application, the React Native framework was selected due to its strong compatibility with JavaScript, which facilitated a smooth and efficient development process. The necessary dependencies were installed, and integrated development environments (IDEs) such as Android Studio were utilized for emulator support. Node.js was employed for backend functionalities, while npm was used for managing and installing essential packages required for the application. A key feature of the application is its offline dictionary functionality. Data was collected from various online sources, including a compilation of terms and corresponding definitions sourced from Vocabulary.com, ensuring users could access dictionary content without an internet connection. Given that the application centers on the story of Romeo and Juliet, the play was carefully reviewed to extract relevant vocabulary terms and definitions for inclusion in the game, thereby enriching the user experience. Multimedia assets, such as images and sound effects, were gathered from online sources that provide materials under free commercial-use licenses. These assets were integrated into the application to create an immersive and engaging environment. The use of these legally obtained resources ensured a professional and polished presentation while adhering to copyright regulations.

13. GAME MECHANICS

To integrate gamification into the mobile application Augustus Word Odyssey, a word puzzle game was developed with gradually increasing difficulty levels: Easy, Medium, and Hard. Each level presents interactive challenges—such as identifying words from images and solving crossword puzzles—to promote vocabulary learning. The images used in the game were gathered from online sources that provide materials under free commercial-use licenses and were carefully selected to match the vocabulary content of each challenge. These images are statically compiled during the build process and preloaded into the application to ensure seamless offline gameplay. To enhance the learning experience, features such as coin rewards for correct answers and brief word definitions were implemented. Additionally, a bonus crossword mini-game appears at key progress points to sustain user interest and create a sense of accomplishment. These gamified elements were strategically designed to boost learner motivation, encourage regular engagement, and support vocabulary development in a fun and user-friendly manner.

Table 5. Game Mechanics

Gameplay Flow	
Levels 1-6 (Easy)	• Player presented with an image and a question clue.
	• Tap on letters provided below the image to form the correct word.
	• Correct guesses reward coins and a brief word meaning.
	• Progress through six levels with increasing complexity.
Levels 8-16 (Medium)	• Two images and a question clue presented.
	• Guess the word related to the images and clue.
	• Use letters provided to form the correct word.
	• Correct guesses yield coins and brief word meaning.
Levels 18-27 (Hard)	• Four images are shown without a question or clue.
	• Tap on letters provided below the images to form the correct word.
	• Players can purchase hints using earned coins to reveal letters.
	• Correct guesses reward coins and brief word meaning.
Crossword Game Level 7, Level 17, Level 28	• After completing each level of difficulty (Easy, Medium, Hard) players unlock a bonus crossword puzzle mini-game.
	• Successful completion of the crossword puzzle proceeds to next level.

14. AUGUSTUS WORD ODYSSEY APPLICATION

The Augustus Word Odyssey application is launched, revealing the dashboard. The dashboard features a selection of classic literature titles, including "Romeo and Juliet," which aligns with the Grade 9 curriculum. The "Read Online" button enables offline reading, while the "Play" button may lead to vocabulary game content related to the book.



Fig.4. Augustus Word Odyssey (a), Dashboard (b)

The Augustus Word Odyssey application's dictionary feature. The dictionary appears to have a search bar and a list of vocabulary words that are found in "Romeo and Juliet," with their definitions and example sentences.

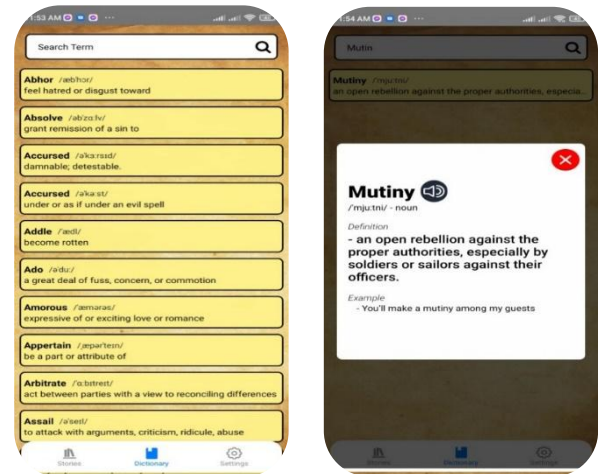


Fig.5. Dictionary (a), Meaning (b)

Augustus Word Odyssey game shows increasing difficulty levels. Starting with a question and one picture, the game adds complexity. The medium level introduces a text clue and two pictures, while the hard level challenges players with four pictures and no text clue to guess the word.

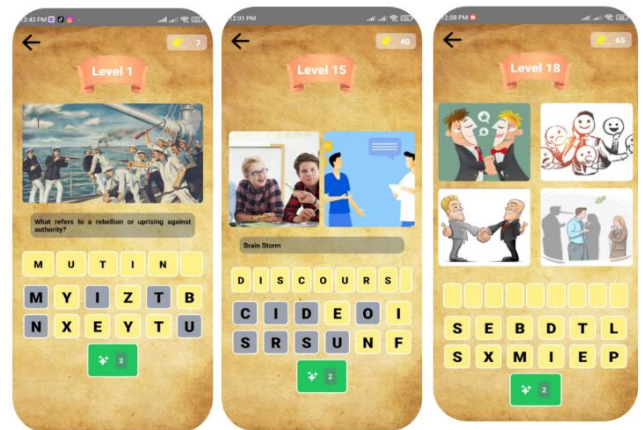


Fig.6. Easy (a), Medium (b), Hard (c)

When you complete a level in the Augustus Word Odyssey game, you receive coins. These coins can be used to progress to the next level upon completing a level, the game displays the definition of the word you had to guess, along with an example sentence, that is related to the story of "Romeo and Juliet."

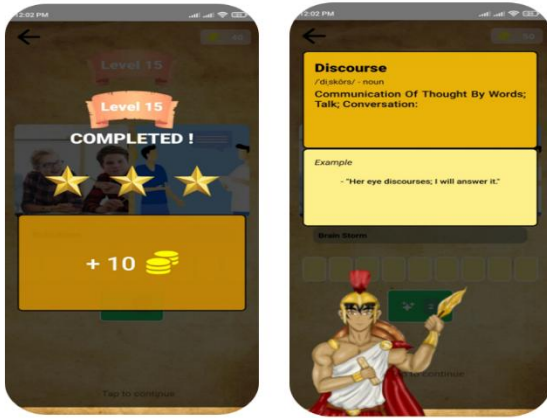


Fig.7. Level Completed (a), Word Definition (b)

This figure shows that after players successfully complete the easy to difficult level, they are presented with a crossword puzzle as a challenge before progressing to the medium difficulty level. To aid players, hints are provided for each word in the crossword. Additionally, players likely have the option to use the in-game dictionary to look up unfamiliar words and solve the puzzle.



Fig.8. Crossword (a), Crossword Hints (b)

The process of searching for a word definition within the application. The first screen shows the user typing 'Mutiny' in the search bar and selecting the word from the dictionary. The second screen displays a pop-up containing the word's pronunciation, definition, and an example sentence. The third screen shows the word being reinforced after completing a level, with a more visually emphasized definition and example, along with a game character.

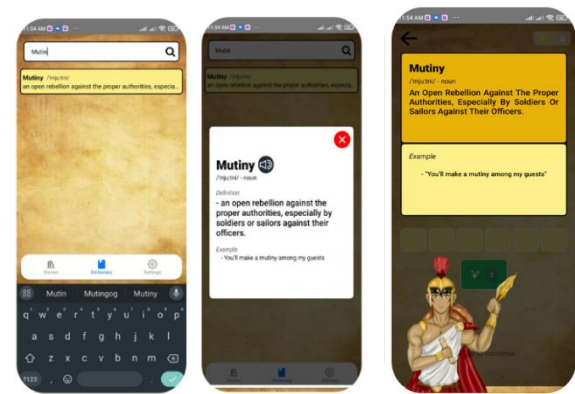


Fig.9. Search bar (a), Pop-up (b), Word Definition (c)

15. DATA ANALYSIS

Figure 10 and Figure 11 presents the students satisfaction levels with gamification of Silang and STE sections. In Silang, 45% of students rated gamification as excellent, followed by 29% rating it as very good, 19% as good, 5% as satisfactory, and 2% as poor as evident in figure 4.1. This shows that most students in Silang are highly satisfied, with the majority selecting Excellent or Very Good, though a small percentage expressed dissatisfaction. In contrast, STE showed slightly higher satisfaction levels, with 46% of students rating gamification as excellent, 36% as very good, 13% as good, and 5% as satisfactory. Notably, no students in STE rated gamification as poor. Overall, both sections exhibited high levels of satisfaction, but STE students appeared slightly more satisfied, as evidenced by higher percentages in the Excellent and Very Good categories and the absence of poor ratings.

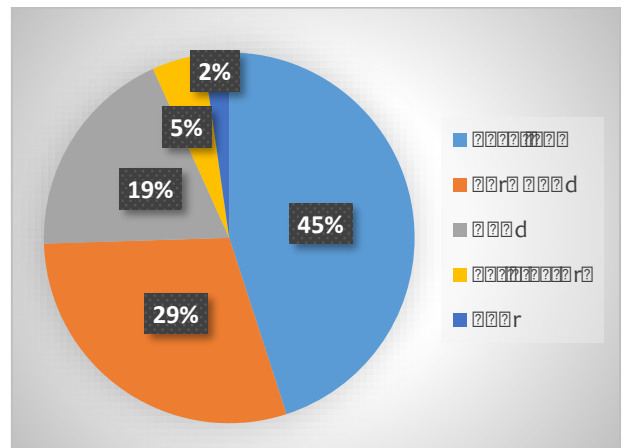


Fig.10. Student Satisfaction Levels on Gamification of Section Silang

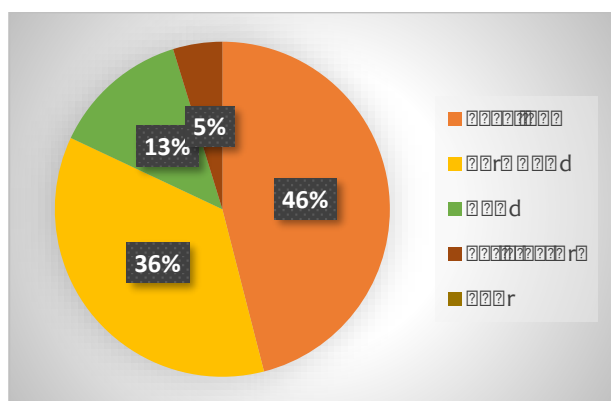


Fig.11. Student Satisfaction Levels on Gamification of Section STE

Table 5. Students Agreement Levels on Digital Preferences in Two Sections.

Student Preferences	Silang				STE			
	Level of Agreement	Frequency	Median	Mode	Level of Agreement	Frequency	Median	Mode
Enjoyment of Digital Learning	1	14	1	2	1	6	2	2
	2	9			2	14		
	3	2			3	4		
	4	0			4	0		
	5	0			5	1		
Motivation of Digital Learning	1	8	2	2	1	9	2	2
	2	12			2	13		
	3	4			3	3		
	4	1			4	0		
	5	0			5	0		
Effectiveness of Digital Resources	1	11	2	1	1	12	2	1
	2	10			2	10		
	3	4			3	3		
	4	0			4	0		
	5	0			5	0		

Table 5 presents the student agreement on digital learning preferences in the STE and Silang sections, focusing on three aspects: Enjoyment of Digital Learning, Motivation of Digital Learning, and Effectiveness of Digital Resources. Both sections exhibited positive perception of digital learning, as indicated by the dominance of Strongly Agree (1) and Agree (2) responses across all categories. Very few students expressed neutrality or disagreement, emphasizing the widespread approval of digital learning methods and resources. While STE students showed slightly higher levels of strong agreement, particularly in enjoyment and resource effectiveness, Silang students displayed a similar trend with a slight preference toward agreement over strong agreement. These results suggest that digital learning strategies are successfully fostering enjoyment, motivation, and effective use of resources among students in both sections, highlighting the general effectiveness of the approach.

16. SUMMARY

This study aimed to help Grade 9 students boost their vocabulary skills through the use of the Augustus Word

Odyssey app, demonstrating the positive impact of gamification on student engagement and learning. While the app showed promise in enhancing vocabulary skills, addressing certain areas for improvement will make it even more effective in supporting student learning. Some areas for improvement were identified, including the need for enhanced error detection and better adaptability to individual learning paces. The app was developed using modern technologies such as JavaScript, React Native, Node.js, and SQLite. These tools enabled offline functionality, which was crucial for delivering an engaging and accessible educational experience. The integration of these technologies also supported the implementation of effective game-based learning mechanics that successfully maintained student motivation and contributed to improved learning outcomes.

17. CONCLUSION

This study aimed to enhance Grade 9 students' vocabulary skills through Augustus Word Odyssey, a gamified learning tool designed to address their struggles with vocabulary comprehension. Both the STE and Silang sections faced challenges in understanding and using new vocabulary, often lacking confidence in their abilities. To support their learning, the app was introduced with interactive features such as image-based word guessing and crossword-solving, aligning closely with the Grade 9 literature curriculum. Despite initial difficulties, students demonstrated high levels of enjoyment and motivation, making the app an effective and engaging tool for vocabulary development. Findings revealed that students had a positive perception of digital learning tools, particularly in terms of engagement. Gamification significantly increased their motivation, with many rating the app's features as excellent or very good. While the app proved effective, areas for improvement were noted, especially in user error protection and adaptability. The study concludes that Augustus Word Odyssey serves as a valuable and enjoyable tool for vocabulary enhancement, making learning more interactive, accessible, and engaging.

18. RECOMMENDATION

- Augustus Word Odyssey should be regularly integrated into classrooms to enhance students' vocabulary skills through gamified learning.
- Improving error detection and adaptability will create a smoother user experience for different learning paces.
- Developing similar digital tools for other subjects can further increase student engagement and motivation.
- User Login Accounts & Leaderboards that displays players' scores, achievements, or progress relative to others.
- AI that allows users to upload PDFs or e-books to the app. Implement AI that can automatically generate quizzes from uploaded materials.

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