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FOUNDATIONS OF READING - LEARNING MALAY SYLLABLE FOR PRIMARY SCHOOL USING GAME-BASED LEARNING

AIZUDDIN NOR JAUDIN
College of Computing, Informatics and Mathematics
Universiti Teknologi MARA
2022770515@student.uitm.edu.my

SITI FEIRUSZ AHMAD FESOL*
College of Computing, Informatics and Mathematics
Universiti Teknologi MARA
feirusz@uitm.edu.my

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Abstract

Although reading proficiency is a very important skill for young learners, a lot of primary school students especially in Year Ones find it hard to master Malay syllables with traditional methods of learning. To address this issue, this project introduces "Foundations of Reading – Learning Malay Syllable for Primary School Using Game-Based Learning." The system is designed as a game-based learning application that engages students through interactive activities which can enhance their reading skills in a fun and effective way. As the main game engine used for development, Construct 3 is utilized in this system, along with Canva for designing graphical assets with, to provide an engaging and visually appealing experience for young learners. This application was developed using the Rapid Application Development (RAD) methodology which provides an iterative and flexible approach in the development of the application, and which enables the application to respond quickly to educational and user needs. A usability test based on the E-Game Flow model was conducted with 20 students to evaluate the game's engagement and overall learning experience, assessing the effectiveness of the application. The results demonstrate that 79.8% of the respondents that used the application had a good time and expressed positive feedback on interactive elements and the game play. This implies that the game-based learning techniques have helped to increase motivation and interaction with the students thereby making learning more fun and enjoyable. In summary, the Foundation of Reading application offers an innovative way to teach Malay syllables, by adding game mechanics, visual learning and interactive exercises. Possible future improvements could be to introduce mobile compatibility, make the features available online, and enable pronunciation feedback using some speech recognition technology to improve learning.

Keywords: Reading, Game-Based Learning, RAD, E-Game Flow

INTRODUCTION

Reading is a complex cognitive process of decoding symbols for the purposes of constructing meaning (Oakhill et al., 2019). Reading involves word recognition as well as comprehension, which enables the reader to understand and absorb information from written or printed text. Engaging with reading from a young age helps build crucial language and literacy skills that lay the foundation for future learning (Irwandi et al., 2019). According to a report by UNICEF (2022), globally around 64% of children by the age of 10 are not able to read and understand a simple written story, which hinders their ability to learn and participate effectively in society. Reading illiteracy can have long-lasting consequences for students, including poor academic performance, higher dropout rates, and limited employment opportunities. In Malaysia, the Ministry of Education has implemented programs to improve literacy, such as the Literacy and Numeracy Screening (LINUS) Program (2009), which identified early learning difficulties. In 2020, it was replaced by the Primary Literacy and Numeracy (PLaN) program, focusing on strengthening foundational literacy skills (Saidin & Mohd Bukhari, 2023). These efforts aim to equip students with essential reading skills for lifelong learning. This shift signifies a new focus on improving foundational literacy and numeracy skills among primary school students.

Problem Statement

Difficulty of staying focused while learning in classroom

Malaysian students often encounter challenges maintaining focus in traditional classroom environments. Studies show that teachers often prefer conventional teaching methods, relying heavily on textbooks as the primary learning material with 67% admitting to using only one textbook when designing lessons (Vojíř & Rusek, 2021). Monotonous and non-interactive teaching methods can quickly lead to boredom, making it easier for students to become distracted (Sadiyah et al., 2024). This lack of focus can result in students missing key information, struggling to retain knowledge, and ultimately performing poorly academically.

The Declining Rate of Literacy Proficiency Among Malaysian Students

The declining literacy performance among Malaysian students is a growing concern. The OECD (2023) reported that Malaysia's performance in the 2022 Programme for International Student Assessment (PISA) showed notable decline in reading scores. This decline in literacy proficiency limits curriculum engagement, hinders problem-solving skills, and lowers academic confidence. Technology plays an increasingly significant role in education, with 79.31% of teachers believing that students heavily rely on technology for learning (Carstens et al., 2021). This indicates that students nowadays are probably more influenced by technology-based learning environments. Therefore, there is a need for more interactive and engaging digital tools specifically designed to support Malay syllable reading skills in order to help tackle the decline in literacy rate.

Project Objectives

There are several objectives that this project will focus on:

1. To design 2D application that facilitates the learning of Malay syllables among primary school students.
2. To develop an interactive game that facilitates the learning of Malay syllables among primary school students using game-based learning.
3. To evaluate the usability of the interactive game in improving students' reading proficiency, particularly in the recognition and pronunciation of Malay syllables.

Project Scope

The target users of this system are for Malaysian primary school year 1 students that struggles in reading. The book of “Bacalah Anakku” (Book 1 and 2) will serve as the primary learning material. This system is a Game-Based Learning and will be designed in a 2D environment in a desktop platform. It will include multimedia elements such as animation, audio, text video and captivating effects to enhance student engagement and motivation. The main language that will be used in this system is Malay. The content of the system will be to focus more on teaching and facilitating students in reading Malay syllables in a fun and entertaining way.

Project Significance

This project aims to bring forth an entertaining way to improve primary school students' reading skills, especially reading in Malay. It offers primary school students a fun and exciting experience that increases their motivation and active participation. The platform serves as a useful tool for parents to enhance their child's education at home. They can monitor their child's progress and performance, fostering a collaborative learning environment. For teachers, this project serves as an innovative teaching resource that complements traditional methods. It allows individualized instruction that addresses the needs of each student. Additionally, teachers can use the platform as an assessment tool to assess student progress and identify areas where additional support could be beneficial to improve the overall effectiveness of their teaching.

LITERATURE REVIEW

Overview of Reading Proficiency

Reading proficiency is the ability to understand, interpret, and critically analyze written texts, essential for knowledge acquisition, communication, and personal growth (Pergar & Hadela, 2020). It fosters critical thinking, comprehension, and lifelong learning. However, in developing and emerging countries, foundational literacy issues are worsening, with a 20% annual rise in reading illiteracy among children and youth (World Literacy Foundation, 2024). Approximately 1 in 5 people struggle with reading proficiency, costing the global economy $1.19 trillion annually due to reduced earnings, employability, and productivity. Immediate interventions are crucial to prevent long-term educational and economic setbacks.

Malaysia has a high literacy rate of 95%, ranking second in ASEAN after Singapore (Hamid, 2023). However, literacy rates have declined by 2.74% from 2010 to 2021, with a further 0.4% drop in 2021 (GlobalData, 2022). Over 175,304 (13%) primary school children cannot read proficiently, and 1.01 million (5.03%) Malaysians lack basic literacy skills (Rahim, 2023). Malaysia’s 2022 PISA scores also reflect a concerning decline in reading proficiency (OECD, 2023). Without intervention, this trend could hinder critical thinking, academic achievement, and workforce competitiveness.

Malaysian primary schools implement various programs to address reading difficulties, including in-class initiatives like the Early Reading and Writing Intervention Class (KIA2M) and the 3M Recovery Program (PROTIM), as well as the Special Remedial Program for students with learning difficulties (Saidin & Mohd Bukhari, 2023). The Literacy and Numeracy Screening (LINUS) program, introduced in 2009, aimed to ensure Year One to Three students master literacy and numeracy before advancing. Its success was evident in improved 2018 UPSR results. In 2020, the Primary Literacy and Numeracy (PLaN) program replaced LINUS, focusing on bridging educational gaps and ensuring all students achieve literacy and numeracy. Despite these efforts, challenges remain, emphasizing the need for continued innovation and awareness in addressing literacy issues.

Game-Based Learning (GBL) Model

Game-based learning in education is an approach that currently uses some game principles to educational environments and enhances learning process (Triantafyllou & Sapounidis, 2023). It involves striking a balance between the subject with the gameplay in ways that the players are able to keep and apply the knowledge in close proximity to real life situations. GBL involves using games as the primary medium for learning, where the game itself is designed to teach specific skills or knowledge while Game elements refer to components commonly found in games that can be integrated into non-game contexts, such as learning tasks, to increase engagement and motivation (Huber et al., 2023). In the context of GBL, game elements are integrated into educational activities to enhance learning outcomes by leveraging the motivational and interactive aspects of games. Game elements are divided by two categories which are game mechanics and game dynamics (Cheong et al., 2014).

Game Mechanics

While there are many definitions of game mechanics in game studies, according to Pandey (2022) game mechanics are fundamental components that make up a game. Such as the different control mechanisms, behaviours, and actions used in a non-gaming context that makes the gam fun and engaging. Examples of game mechanics include challenges, competition and levels.

Game Dynamics

Users are motivated by game mechanics because of game dynamics. Game dynamics are the core game design principles that create and support aesthetic experiences (Pandey, 2022). They define how the game and players evolve over time, influencing engagement and satisfaction. Game dynamics address fundamental human desires and needs such as reward, feedback and achievement.

Project Development Technology

Project Development Technology in game-based learning involves the systematic application of scientific methods and technological tools to develop and implement game-based learning solutions within a project context (Jääskä et al., 2022). By applying Project Development Technology, game-based learning solutions can be systematically designed, developed, and deployed to engage learners, promote active discovery, and achieve desired learning outcomes within a project context.

Game Platforms

Game platforms serve as the foundation for interactive multimedia experiences, allowing players to engage with digital content through various hardware and software configurations. Desktop platforms, which rely on computers with powerful hardware, provide high-resolution graphics, extensive customization options, and support for multiple input devices (Madeira et al., 2022). Windows, as the dominant operating system for PC gaming, offers an extensive gaming ecosystem favoured by developers (Sherif, 2024). In contrast, mobile platforms, including Android and iOS, prioritize accessibility, portability, and cloud-based interactivity, making learning more engaging and convenient (Toppo & Dhote, 2021). While Android's open-source nature allows for extensive customization, iOS is recognized for its security and streamlined user experience. The choice of platform significantly influences game design and user engagement. For this project, the desktop platform is chosen due to its superior customization options, ensuring a more immersive and seamless gaming experience.

Game Genres

Game genres categorize games based on shared mechanics, narratives, and player interactions, impacting learning outcomes and engagement. Adventure games challenge players with problem-solving tasks, fostering cognitive skills through interactive narratives and exploration (Kristiadi et al., 2019). Visual novels, primarily text-driven, immerse players in interactive storytelling with branching narratives, enhancing decision-making skills and subject matter comprehension (Øygardslia & Shin, 2020). Educational games incorporate various gameplay elements to make learning more engaging, offering subjects like mathematics, science, and language learning through interactive experiences (López-Fernández et al., 2023). This project will focus on educational games, ensuring that players develop reading proficiency through engaging gameplay mechanics and interactive challenges.

METHODOLOGY

The game-based learning application proposed for teaching Malay syllables utilizes the Rapid Application Development (RAD) methodology as recommended for its rapid prototyping and iterative progress (Chien, 2020). RAD consists of four phases which is requirements planning, user design, construction, and cutover. Figure 1 depicts the phases of the RAD model.

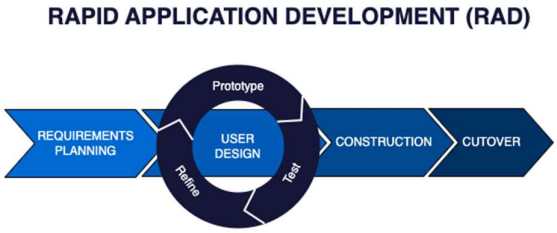


Figure 1: Rapid Application Development Model

Requirement Phase

The requirement phase is the initial step in the project development process. During this phase, all necessary information and data are gathered to identify the primary problem, desired outcomes, and methods for addressing the issues. Figure 2 illustrates the project's requirement planning phase.

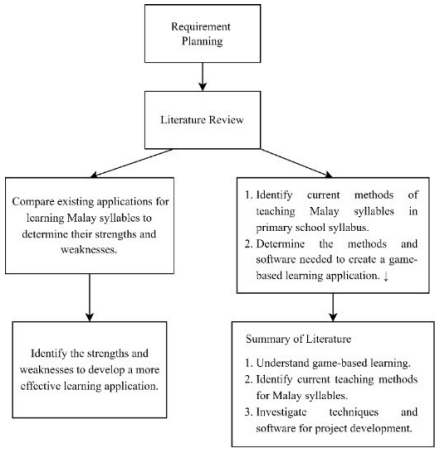


Figure 2: Project's Requirements Planning Phase

User Design

The User Design phase focuses on creating the system's layout, features, and functions. It involves designing the use case, flowcharts, and prototyping for the game application. Figure 3 shows the project Use Case highlighting key player interactions. Players can learn and practice alphabets and syllables, engage in quizzes or games, and adjust settings to personalize their experience.

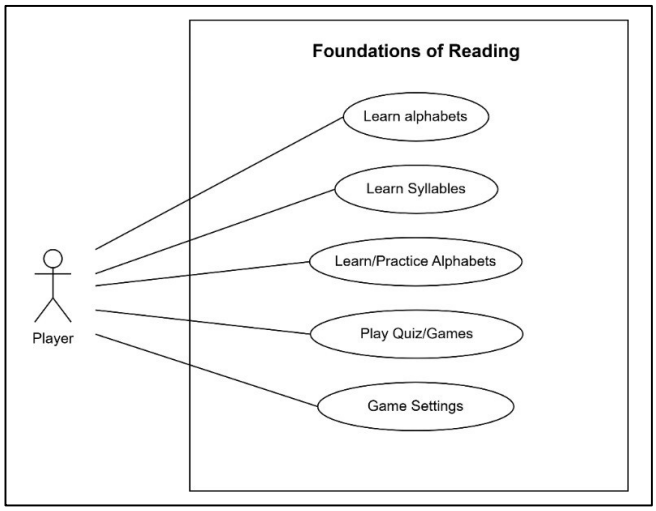


Figure 3: Application's Use Case

Figure 4 shows the flowchart for the project. In the Settings, players can adjust volume and return to the Main Page. In the Learning section, they can access the Reading section and

repeat the activity or return to the Main Page. In the Playing section, they can choose a game, play again, or return to the game selection or Main Page. The Exit section prompts the player to confirm exiting or return to the Main Page. This flowchart guides players through learning, gameplay, and options for settings and exiting the game.

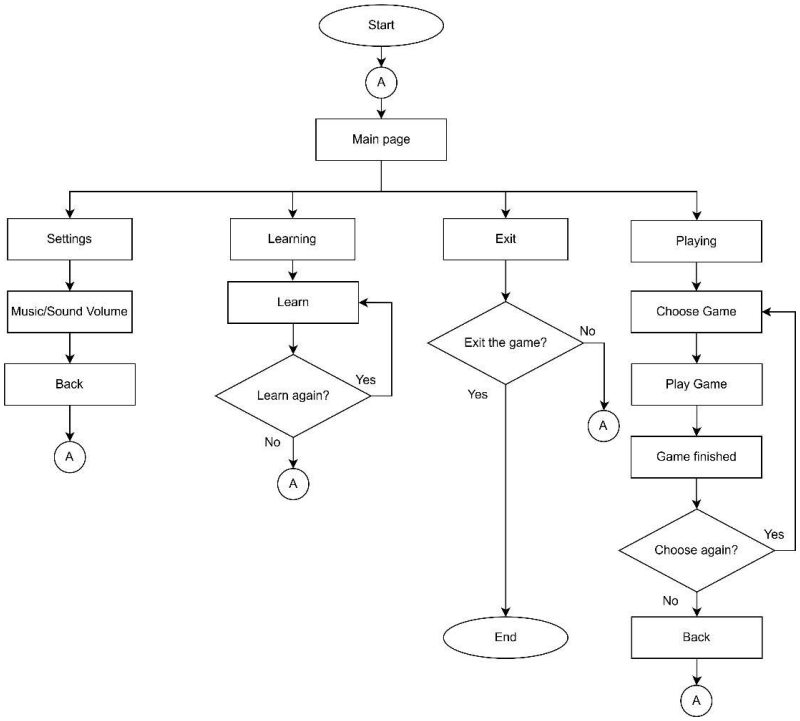
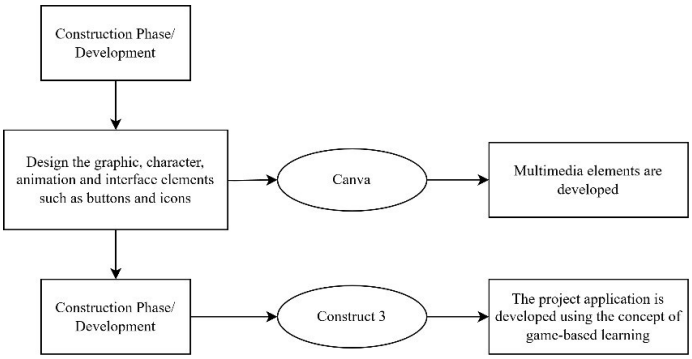


Figure 4: Application's Flowchart

Construction

The construction phase, also known as the development phase, is where the actual coding and development of the application take place. It focuses on building software components based on earlier prototypes and design specifications. Developers work iteratively to design, code, test, and integrate features rapidly. The user design phase plays a critical role in creating elements like interfaces, buttons, and graphics, enabling quick prototyping and continuous refinement to meet quality standards and project requirements. Figure 5 shows the construction phases for the project.



Cutover

The cutover phase constitutes the final stage in the RAD methodology. The completed project undergoes testing during this stage to spot any required modifications while confirming that its functionality together with stability and usability and maintainability align with the established standards. The System Usability Scale (SUS) evaluation for the proposed application will occur by testing Foundations of Reading game with the assistance of the E-Game Flow model. The model will evaluate if the project fulfills existing requirements and needs of its structure.

RESULT AND DISCUSSION

SUS testing is a method for evaluating how engaging and enjoyable a game is for its intended audience. In this project, the E-Game Flow model was applied to assess several aspects of game usability among students, such as challenge, goal clarity, feedback, concentration, immersion, and overall enjoyment. A questionnaire based on the E-Game Flow model was administered after primary school students played the game, providing insights into whether the game was engaging, enjoyable, and effective in promoting their interest in reading.

Table 1: Questionnaire results

Question	Total Mean
1	4.45
2	3.55
3	4.30
4	3.65
5	3.95
6	4.00
7	3.95
8	4.60
9	3.70
10	3.75
Overall	**3.99 (79.8%)**

Table 1 shows results of the questionnaire. Most of the questions received high ratings as majority of the responses falls into 'Agree' and 'strongly Agree' categories where the mean is above 3.4. Question 8 had the highest mean of 4.6 or 92% which means that students really liked this element of the game. On the other hand, question 2 had the lowest mean by 3.55 or 71% which means this element was slightly less fun. The remaining elements scored around the average, indicating a well-balanced level of engagement and enjoyment in the game.

Based on the findings, the overall test results show positive outcomes regarding students' engagement and the game's usability. The average mean score of 3.99 (79.8%) indicates that the game effectively captured students' interest and provided an engaging learning experience. Positive ratings were observed across all aspects, demonstrating that the game was easy to use and maintained students' attention. While some elements received mixed feedback, the overall responses highlight the game's success in sustaining interest and making the gameplay enjoyable. These results suggest that the game can be utilized to engage students and enhance their learning experience.

CONCLUSION

This project concludes with the successful development of a game-based learning system designed to enhance student engagement and enjoyment in learning Malay syllables. The system addresses the challenges of low motivation and lack of interactive learning tools. Interactive learning, pronunciation guides, animations, and a reward system are provided to incorporate more engaging learning. The system which is developed using the Rapid

Application Development (RAD) methodology is optimized for desktop platforms and is therefore accessible for classroom and home use. This study investigated the evaluation using the E-Game Flow Model and the SUS to assess the game's overall usability and how it maintains students' interest and immersion in learning.

Finally, this project creates a strong basis for the concept of interactive reading education based on the game mode for learning the Malay syllables. Although it still has some limitations, with some improvements, the system can become an even more efficient and comprehensive learning tool that can help with early literacy development in fun and entertaining ways.

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