

Technological University of the Philippines

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Software Engineering



HangJuan: Development of Hangman Mobile Game for Learning

Filipino Culture

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Abstract

HangJuan: Development of a Hangman Mobile Game for Learning Filipino Culture is a Hangman Game for Learning Vocabulary, an educational software project intended to increase language learning and vocabulary mastery via an interactive and entertaining gaming experience. The project's goal is to create a digital Hangman game application that can be utilized by students of all ages and levels of language skill with the use of the Godot Game Engine. The integration of technology into the education system has been a significant development in recent years, and this project seeks to leverage the educational benefits of digital games. Despite its simple nature, Hangman can be a valuable tool for learning, particularly in terms of word knowledge, construction, and meaning. By incorporating Filipino cultural elements into the game, HangJuan aims to provide an engaging and interactive platform for players to learn about Filipino culture while playing the game. This project recognizes the importance of cultural understanding and aims to address the lack of familiarity with or awareness of Filipino culture among individuals. By combining gameplay and educational content, HangJuan seeks to promote cultural learning in an enjoyable and accessible manner.

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Chapter 1

THE PROBLEM AND ITS SETTING

Introduction

In light of the recent developments in technology, its growth has resulted in various applications to human activity, which includes its contributions to education. According to Hoyles and Lagrange (2010), the integration of technology into the education system as one of the effects of digital technology development.

While often overlooked of its educational benefits due to the nature of the game, wherein it usually ends up with a stickman being hanged after several wrong guesses. Hangman is a classic word guessing game that is generally played by two or more people. Wherein one player comes up with a phrase or word that the other players have to guess by taking turns on what letters may be included in the to be guessed phrase or word. With each turn of guessing while avoiding making the wrong guess as multiple wrong guesses would lead to a game over. It could be played on a blackboard, whiteboard, paper, and the like but nowadays with the advent of electronic games in the forms of video games, it is also possible to play the classic game as a video game.

One's culture is important as it is what a person's life usually leads to how they live. According to FilipinoPod101 (2021), learning about the culture of a group of people is what tells on how they see the world different from other cultural groups. However, more often than not people become unfamiliar with it over time or are aware of it but they don't know what it's called. According to BKK Kids (2022), since they include word knowledge, construction, and meaning, word games are great for education. These skills can help kids grasp what they read in books and learn how to spell things. As such, this project tries to aim incorporating Filipino culture into a classic game of Hangman as a simple educational video game.

OBJECTIVES OF THE STUDY

General Objective

The main objective of this project is to develop a Hangman game that aims to provide an entertaining yet informative game experience about Filipino Culture.

Specific Objectives:

1. To promote learning and familiarization with Filipino Culture
2. To provide informative questions and trivia about Filipino Culture
3. To develop a user-friendly and easy-to-use interface
4. To establish entertaining and challenging gameplay so the user can learn while having fun.

SCOPES AND LIMITATIONS

The project's primary gameplay mechanic will be greatly influenced by the rules of the traditional game Hangman. In the age-old word game known as a hangman, your goal is to correctly identify as many hidden words as you can before the clock runs out. In addition to educating people about Filipino culture and disseminating trivia and information, the project's objectives include compelling and motivating participants to learn. Godot engine will be used to create the project. Filipino tradition, practices, national symbols, folklore, and other aspects of Filipino culture are included in the project's primary focus on Filipino culture as a hangman topic. Categories such as different festivals, Filipino snacks and delicacies, national artists, and iconic arts are also included. In folklore, the emphasis will be on generally recognized folklore, such as notions of legendary beings and myths, epics, and other stories. Additionally, the project won't be able to obtain official paperwork or examine the veracity of specific information that is challenging to prove.

SIGNIFICANCE OF THE STUDY

The development of the mobile game HangJuan, which focuses on studying Filipino culture, is essential for promoting cultural awareness and education among a variety of target audiences. This section talks about the research study's possible beneficiaries and the benefits that will occur to each of them.

For Students and Learners

The research study's main benefits are Filipino culture students and learners in the Philippines and around the world. For them to discover and comprehend every component of Filipino culture, the HangJuan mobile game will offer an interactive and engaging platform. Students may have a fun and engaging learning experience while increasing their understanding of Filipino customs, history, folklore, language, and more by gamifying the educational process.

For Educators and Teachers

Educators and teachers gain from the research study as well because it gives them an innovative teaching resource. With the help of HangJuan, teachers may explain Filipino culture in an engaging way. HangJuan can be incorporated into the curriculum as an additional learning resource. Because of the interactive element of the game, which encourages involvement, educators will find it simpler to pique students' interest and inspire discussions about Filipino culture.

For Travelers and tourists

For visitors and travelers visiting the Philippines, HangJuan can be a useful resource. The game can give players a glimpse into the various components of Filipino culture and help in their

understanding of the nation's customs. Their travel experiences could be improved by this information, which may additionally promote cultural sensitivity and responsible tourism.

For Cultural Preservation and Heritage Organizations

The development of HangJuan helps to preserve and promote the rich cultural legacy of the Filipino people. The game spreads knowledge of the depth and distinctiveness of Filipino culture by incorporating elements of folklore, historical events, and traditional behaviors. In order to attract a larger audience, especially younger generations, and create a sense of pride and belonging in their cultural identity, cultural preservation and heritage organizations should use HangJuan.

Chapter 2

THEORETICAL FRAMEWORK

The constructivist learning theory, which emphasizes the active building of knowledge through meaningful and genuine experiences (Piaget, 1972), is consistent with the ideas of game-based learning. Games give students the freedom to experiment, investigate, and decide for themselves, enabling them to build knowledge in an exciting and richly contextualized setting. The paradigm recognizes the value of learner agency and the function of games as cognitive instruments for the creation of knowledge. Different cognitive processes that aid in learning and skill development are incorporated into game-based learning. The framework emphasizes how important decision-making, problem-solving, and critical thinking are in games (Gee, 2003). These procedures heighten knowledge and skill transfer to real-world situations, develop deeper understanding, and boost learners' cognitive talents.

By giving students hands-on opportunities to learn about Filipino culture, HangJuan aligns to the constructivist learning paradigm. Through the game's framework, learners are given the

opportunity to explore cultural aspects, make choices, and get a deeper knowledge. As students actively construct knowledge by interacting with the gaming world, this is consistent with the constructivist approach. In order to promote cultural learning, HangJuan involves students in a variety of cognitive processes. Problem-solving, critical thinking, and vocabulary building are some of the game's components that help players develop their cognitive skills and gain a greater understanding of Filipino culture. HangJuan promotes cognitive engagement and knowledge development by offering culturally appropriate hints and encourages students to infer cultural terminology and concepts.

Review of Related Literature

Introduction

Hangman is a classic word guessing game. Players attempt to decipher a word by speculating on its letters. Based on a study, one way of teaching vocabulary is through the game of hangman (Novriana et al., 2013:113). Using the idea of the hangman game, students are challenged to predict words. Thus, it could increase pupils' motivation to study English. Students may work on their spelling and pronunciation through the game. More significantly, kids pick up new vocabulary. Video games become popular nowadays, Young Filipinos are increasingly turning to video games as a major means of leisure, replacing more traditional pastimes. Video games are gaining a lot of attention since they have recently been shown to be a form of mass media that is rapidly developing. Traditional games also lost some of their appeal. Due to the pressure of the combined impacts of globalization and numerous foreign influences, these traditional games are at risk of being extinct (Hassan et. al., 2013). Due to the cooperative character of traditional games, studies by Rabago-Mingoa, Estacio, & Perlas (2014) and Gelisli

& Yazici (2015) came to similar results on the close social links that they develop in families, schools, and communities. By outlining some of the procedures necessary in developing a mobile game that would promote and conserve Filipino culture, the preceding research offered support for the findings of the current study. To put it simply, the game is great educational tool for children that will aid in their full learning of Philippine Culture. The primary objective of this project is to create a hangman mobile game that aims to educate players about Filipino culture while still being enjoyable.

Learning Language in Gaming

The purpose of the study, "The Use of Hangman Game in Motivating Students in Learning English," was to see if the hangman game might inspire students to learn English. A quantitative research design was used in conjunction with an experimental research approach in this investigation. The study's target audience was eighth-grade students from MTs Negeri Cirebon 1, with a total sample size of 36 students drawn from two classrooms. During English sessions, the experimental group played the hangman game, while the control group used the traditional teaching technique. Both groups received instruction on how to create recount texts. Observation and questionnaires were used to obtain data from both groups..

According to Prasetiawatias, as quoted in Wiratania (2018), the hangman game offers various benefits. For starters, it motivates pupils and boosts their desire to study a language. Second, it serves as a means of passing the time. Third, it enhances pupils' pronunciation, attentiveness, and spelling skills. Fourth, it promotes healthy rivalry and collaboration among

students, as well as the acquisition of useful skills. Hangman games are intended primarily to improve vocabulary, memory, and critical thinking abilities (Wiratania, 2018).

Vocabulary is important in language acquisition because it influences reading and listening comprehension (Hidayat, 2015). A large vocabulary allows teachers and students to communicate effectively during the learning process. As a result, building vocabulary skills is critical for language learners (Hidayat, 2015).

The importance of vocabulary expansion in language acquisition was underlined in the research of young learners. Vocabulary is utilized for communication, whether listening or speaking, and it has a direct impact on reading and writing ability. The hangman game is a method for teaching vocabulary in which students predict words based on the game's premise, boosting their motivation to learn English and improving their spelling and pronunciation (Novriana et al., 2013).

Su et al. (2021) investigated the effectiveness of mobile and non-mobile digital game-based language learning in a comparative assessment of mobile and non-mobile games for language acquisition. The review examined 64 publications published between January 2000 and August 2020 and classified them into four categories: game types, game elements, target languages, and learning results. Gamification, simulation games, and immersive games were found to be regularly employed in the study, and all games had aspects such as objectives or regulations. The most typically studied target languages were English and Chinese, with learning goals focusing on language acquisition and psychological/affective state. The evaluation gave a thorough overview and in-depth analysis of mobile and non-mobile games for language learning, aiding professionals in selecting the best online games to meet their goals (Su et al., 2021).

In conclusion, the utilization of the hangman game in various circumstances connected to language acquisition has been investigated. It has been shown to be beneficial in engaging pupils, improving vocabulary abilities, and serving as a useful tool for language learning. Furthermore, a comparison of mobile and non-mobile games gives insights into the efficacy and features of various game kinds, supporting educators in picking appropriate language learning games.

Learning Culture in Gaming

Topography, history, and centuries of contact with foreign civilizations and colonial powers have all shaped Filipino culture (Williams, 2015). The Western video game industry's dominance has hampered the production of original Filipino video games, yet initiatives are underway to educate Filipino culture and identity through video game development (Williams, 2015). Similarly, a smartphone game was developed in Finland to teach players about the history of Kemijärvi town (Luiro et al., 2019). This game sought to achieve a balance between historical accuracy and a captivating gaming narrative, enlisting the help of history experts in its creation (Luiro et al., 2019).

Immigrants have obstacles as they acclimate to their host country's culture, and game-based learning can help them with this (Dunwell et al., 2013). Dunwell et al. (2013) employed mobile devices to deliver learning tools and services to immigrants, emphasizing entertaining gaming experiences and data analysis for successful learning. A mobile game called m-MyTale was created in Malaysia to teach young people about culture and history via the narrative of "Puteri Gunung Ledang" (Nusran & Zin, 2010). The game featured 2D animation and complexity levels depending on the princess's requirements (Nusran & Zin, 2010).

To enhance cultural heritage learning, an adjustable multi-learner serious game was devised, boosting collaboration and communication between players and instructors (Lazarinis et al., 2022). In Taiwan, a game-based application based on the SoLoMo concept was created to promote local culture learning, resulting in better learning accomplishment, retention, and motivation (Lin et al., 2018). Another gaming application, Malaysia Run, was developed to promote Malaysian culture through gamification while also delivering an interesting learning experience (Teoh et al., 2022).

Interactive educational games, which are especially interesting to young people, provide a new means to communicate knowledge about cultural heritage. Game templates and layout styles simplify the game design process, enabling the construction of complicated games with a variety of learning objectives (László Márkus et al., 2018). Understanding cultural qualities is critical in game localization since it ensures that the game is acceptable for the target audience's local culture (Pokémon Go) (László Márkus et al., 2018).

In conclusion, these research show that video games have the capacity to teach and promote cultural heritage. They stress the significance of include historical authenticity, user feedback, and cultural awareness in the production of these games. These studies attempt to engage players and enable cultural learning in a pleasant and successful manner by integrating game-based learning, mobile technology, and interactive multimedia.

Game Based Learning

The research "Climate hangman: A word challenge educational game" provides an educational computer game with a User Interface (UI) meant to teach K-16 and lay audiences about the risks of climate change and the science behind it. The authors highlight educational

computer games' immersive and participatory nature as a good method to climate change teaching. The game provides an interactive learning environment for players to learn about climate concerns, and user research on the game shows its potential for effectively educating youngsters about climate change. This educational word challenge game provides a unique and approachable tool for teaching students and broad audiences about the effects of climate change.

The researchers investigate the learning effects of incorporating game components into educational music games for learners of various ages in the study "Can Gamification Assist Learning? A Study to Design and Explore the Uses of Educational Music Games for Adults and Young Learners". The game-based learning materials were designed in two versions: one with full game features and one with a minimalist design that focuses on core game interaction. The study included 50 young students and 41 adults who took part in pre- and post-tests, questionnaires, and interviews. In terms of learning outcomes for both age groups, statistical analysis revealed that the simple version of the game-based materials outperformed the entire version. The findings suggest that game-based learning environments can greatly improve students' learning motivation and performance. The study does imply, however, that game designers should take into account learners' cognitive load and information processing capacity, focusing on enhancing game components rather than merging many gamification elements. This method can efficiently meet the combined aims of effective instruction and enjoyable gaming.

Sanchez and Lee (2022) explore the challenges faced by researchers in establishing a clear correlation between games and learning outcomes in game-based learning in their work "Understanding the Challenges of Game-Based Training: Recommendations for Moving Research Forward in Game-Based Learning." The authors acknowledge the substantial investment in game-based learning across various fields but highlight the lack of consistent data linking games to

specific learning outcomes. They describe five challenges that game-based learning researchers face, including the variety of game designs, measurement concerns, the necessity for longitudinal studies, individual variability, and the limits of existing research approaches. To address these issues, the authors provide future study recommendations, stressing the use of standardized methodologies, consistent measurements, and assessment tools in game-based learning research. They also suggest performing longitudinal studies to better understand the long-term benefits of game-based learning interventions and tailoring game-based therapies to the needs of the learners. It is also proposed for the creation of new research approaches capable of capturing the intricacies of game-based learning.

In the article "Are Games Effective Learning Tools? A Review of Educational Games," De Freitas (2018) conducts a comprehensive assessment of the research on educational games. The author highlights the difficulties and advancements in understanding the usage, efficacy, and design of educational games. The educational game literature has grown gradually and in phases, resulting in fragmentation and uneven reference across fields and nations. Educational games lack a defined disciplinary perspective due to their multidisciplinary nature and reliance on context-specific studies. Furthermore, changes in nomenclature and the usage of multi-methodological methods have added to the field's complexity. Researchers from education science, game science, neurology, and information science have provided unique perspectives on instructional games, resulting in quantitative, comprehensive, and nuanced research, particularly in therapeutic health applications, serious games research, effectiveness studies, and comparative analyses. Through multidisciplinary research, the paper analyses the progress achieved in identifying the potential of educational games as excellent learning tools.

The authors of "Game-Based Learning in Science Education: A Review of Relevant Research" (Li & Tsai, 2013) perform a qualitative content analysis of empirical research publications published between 2000 and 2011 on game-based science learning (GBSL). They look into the research objectives, designs, game design and execution, theoretical underpinnings, and learning objectives of 31 selected papers. According to the review, cognitivism and constructivism were the most widely employed theoretical viewpoints among GBSL researchers, while socio-cultural perspectives and inactivism have emerged as growing perspectives. The majority of the study focused on the use of digital games to increase scientific knowledge and concept acquisition, with fewer studies focusing on problem-solving abilities. Only a few research looked into outcomes like scientific processes, emotion, engagement, and socio-contextual learning. Based on their findings, the authors recommend that present GBSL research be expanded to include emotional and socio-contextual dimensions of scientific learning. They also look at how digital games can be used as tutors, tools, and tutees in science education, emphasizing their ability to bridge the gap between the real and virtual worlds, facilitate collaborative problem-solving, create emotional learning environments, and support science learning for younger students.

In the study "Videogames as a learning tool: is game based learning more effective?" Sousa and Costa (2018) conduct a Systematic Review of Literature with Meta-analysis to examine the educational potential of video games. The review aims to compile quantitative findings from digital Game-Based Learning (GBL) methodologies and draw conclusions about the value of using video games as a learning strategy in different contexts. The study finds 14 experimental investigations from a selection of 68 publications that were chosen based on inclusion criteria such as RCTs, digital GBL methodologies, and metrics for determining real learning effects. According to the findings, digital GBL methods had bigger effect sizes than traditional approaches, resulting

in more significant and effective learning outcomes across a combined sample of 1685 individuals. The research is part of the GamiLearning initiative, which aims to increase media literacy among young people aged 9 to 12 through group learning activities that use digital games.

This concludes, game-based learning is an innovative and entertaining educational technique. Educators may build dynamic learning experiences that improve motivation, performance, and information acquisition among learners of all ages by exploiting the immersive and interactive nature of games.

Roles of Games in Education and Preservation

Lenhart (2015) analyzes video games' rising popularity among young Filipinos and the possible danger they pose to traditional games. This underscores the need of investigating the use of games in the preservation of cultural assets. Traditional games have been shown to enhance collaboration, cognitive development, and values in youngsters, according to Rabago-Mingoa, Estacio, and Perlas (2014) and Gelisli and Yazici (2015). These findings provide credence to the notion that games may be effective teaching tools for fostering cultural awareness and historical knowledge.

According to the findings of a research on "Computational Thinking in Educational Digital Games: An Assessment Tool Proposal" (ISTE and CSTA, 2011), there is a need for evaluation tools to analyze the efficiency of educational games in building computational thinking abilities. This study contributes by presenting a checklist as an evaluation tool to analyze the alignment of educational games with computational thinking abilities, serving as a reference for game producers and educators (ISTE and CSTA, 2011).

The author of "Finding and Evaluating Great Educational Games" underlines the usefulness of frameworks in assisting educators in selecting and evaluating educational games.

The paradigm presented here provides a systematic way to studying how games improve learning and evaluating their alignment with learning goals. It features a feedback form for students as well as a checklist for instructors, allowing educators to make educated judgments about introducing games into their teaching techniques.

Tang and Hanneghan (2015) emphasize the value of well-designed games that integrate compelling gameplay with pedagogically sound theory. Their suggestions try to bridge the gap between amusement and education, allowing for effective game-based learning experiences.

Casey, Baghaei, and Nand (2014) investigated the influence of an instructional tool on primary school children's learning outcomes. The study shows that incorporating game aspects into instructional tools can considerably increase learning outcomes, demonstrating the potential of game-based tactics in improving learning outcomes.

Lawler and Smith (2021) address the advantages of introducing game creation into history instruction, highlighting the active participation and greater knowledge that students acquire by developing history-based digital games. They contend that game development in the classroom may bridge the gap between traditional historical techniques and digital humanities by encouraging historical thinking and research methodologies while embracing technology and computational abilities.

Doney (2019) investigates the usefulness of gamification components in e-learning activities, with the goal of identifying factors that contribute to the attraction and efficacy of game-based learning, particularly for adult learners. The study sheds light on the benefits of game-based learning in terms of boosting learning outcomes and motivation.

Adams et al.'s study on story-based adventure games contradicts the premise that narrative games are more helpful for learning. In terms of learning outcomes, the findings suggest that short-

duration story games may not be more successful than other teaching techniques. The research, however, did not investigate extended durations of gameplay.

Li, Cheng, and Liu (2013) provide a paradigm for creating game-like learning systems based on constructionism. According to their findings, computer simulation and the framework's principles help to stimulate exploratory learning activities and accommodate students with varying levels of expertise. The approach benefits students with lower baseline knowledge and improves learning for students with middle- and high-level background information.

In conclusion, the study underlines computer games' rising popularity and the possible threat they represent to traditional games and cultural traditions, particularly among young people in developing countries. It emphasizes the significance of investigating the use of games to conserve cultural traditions and history.

Conceptual Framework

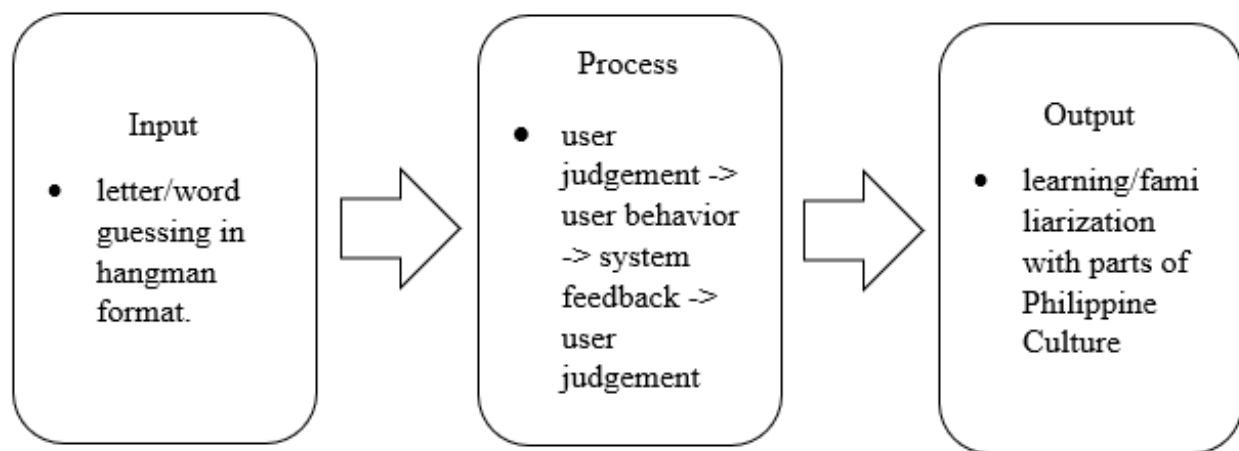


Fig 1. Framework Concept

The diagram depicts the Hangman Mobile Game Research Paradigm that provides an illustration that lets readers understand the concept of the study. The paradigm focuses on a mobile app that acts as a Hangman game, with players attempting to guess letters or sentences.

The method starts with the user guessing a letter or a complete word in the Hangman format. The system then examines the user's guess to decide if it is correct or erroneous.

The system generates an output after analyzing the user's guess. This result is important because it shows if the user has learned the information included in the provided word from the Hangman game. The output essentially acts as a gauge of the user's learning success depending on their engagement with the Hangman format.

System Architecture

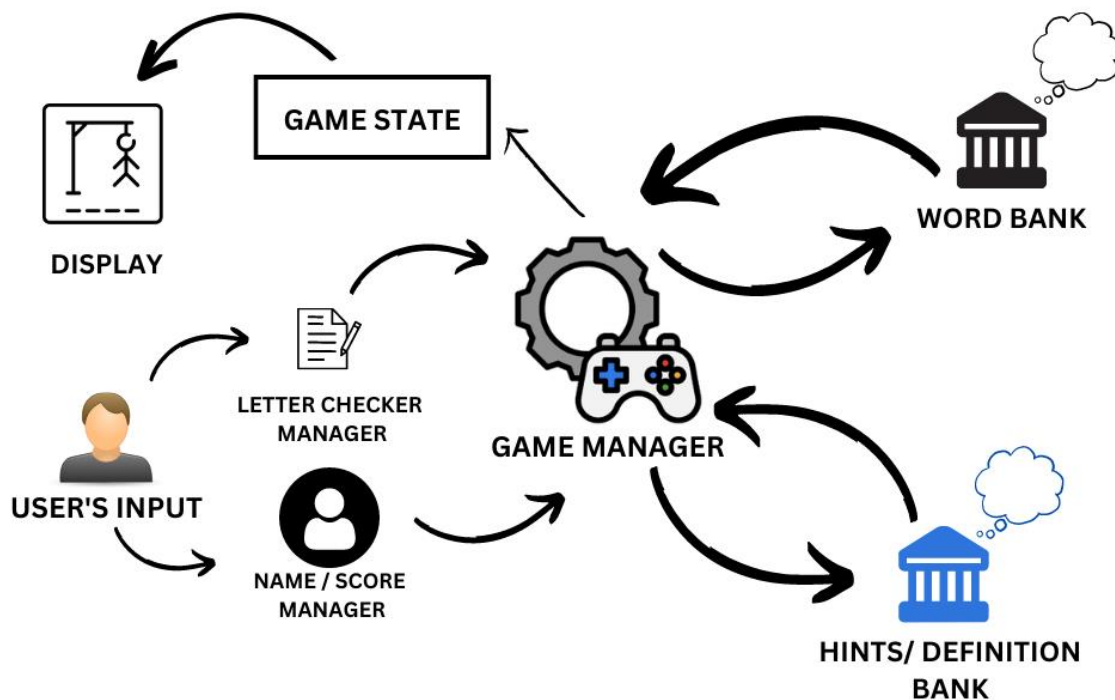


Fig 2. Architecture Design

Definition of Terms

Cognitive process - refers to the mental activities involved in acquiring, organizing, processing, and applying knowledge.

Educational Tool - a resource or technology used to facilitate teaching and learning processes.

Game-based learning - refers to the integration of educational content and objectives into game design and mechanics to facilitate learning and engagement.

Game manager - managing and directing many components of a game, including as rules, progress, and player interactions, to create a seamless and pleasurable gaming experience.

Gamification - is the use of game design concepts and mechanisms to engage and encourage people in non-game situations.

Godot engine - is a well-known open-source game development framework and gaming engine. It has a full range of tools and capabilities for developing 2D and 3D games for numerous platforms.

Hangman - is a traditional word game in which participants must guess the hidden word one letter at a time.

Pedagogy - refers to the science and art of teaching, including instructional methods, strategies, and approaches.

Word Bank - collection of words that will be used in the game, words that will be guessed by the users.

Chapter 3

METHODOLOGY

Project Design

This project will develop an Android mobile game coded in Godot engine. The research will be using several modeling tools to analyze the scope and requirements of the game's development.

System Design

The mobile application's model is presented using a Data Flow Diagram which shows how the system handles the in-game data represented by shapes and arrows. The game obtains the hidden random words from a word database which contains the list of possible terms. Whenever a player wins the data is stored in the game's statistics and that same statistics is where the game will gather the data.

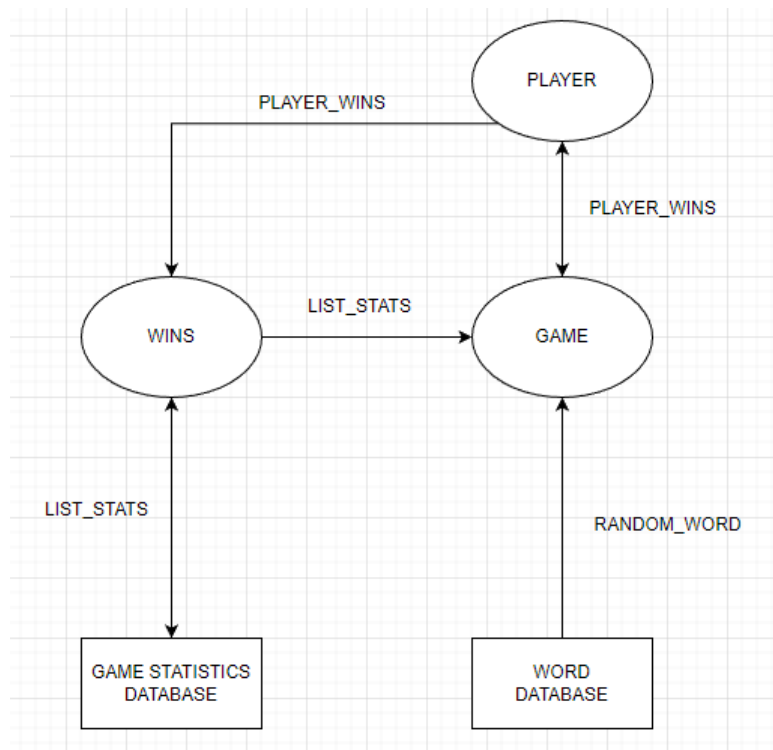


Fig 3. Data Flow Diagram of the Filipino iteration of Hangman Mobile Game

Software Design

Hangman works by taking a random word from a database and the player has to guess the hidden word. The word database generates a random word from a category, and then the user will input the letter by guessing the letter. If the guess letter is correct, the hidden word will be revealed. The user will add the letter, and it will show letters on the screen if the guess is correct. If the user guesses correctly, it will show the win stats. Hence, it will display the end screen. If the user did not get the correct answer, it will appear on the end screen, and the game is over. Thus, it will display the end screen.



Fig 4. Context Diagram of the Filipino iteration of Hangman Mobile Game

Game Design

When the application is opened, it first shows the game menu containing the options to start a new game or exit the game. Selecting the first option prompts the user to select a category of their choosing while the other option will promptly close the application. After the user has selected a category, they are given a hidden secret word to guess it under seven (7) mistakes or 7 lives. For each user input, the application checks if the pressed input is correct, if it is then the hidden letters matching the input will be revealed, otherwise the player will lose a life and the process is repeated until the user runs out of lives, or the hidden word is completely revealed. If the player runs out of lives before completing the word, the application will then reveal the hidden word in the game over screen. Winning or losing the game leads to a prompt whether the

user wants to continue or not, pressing yes will give the player a new word in the same category while pressing no will go back to the main menu screen.

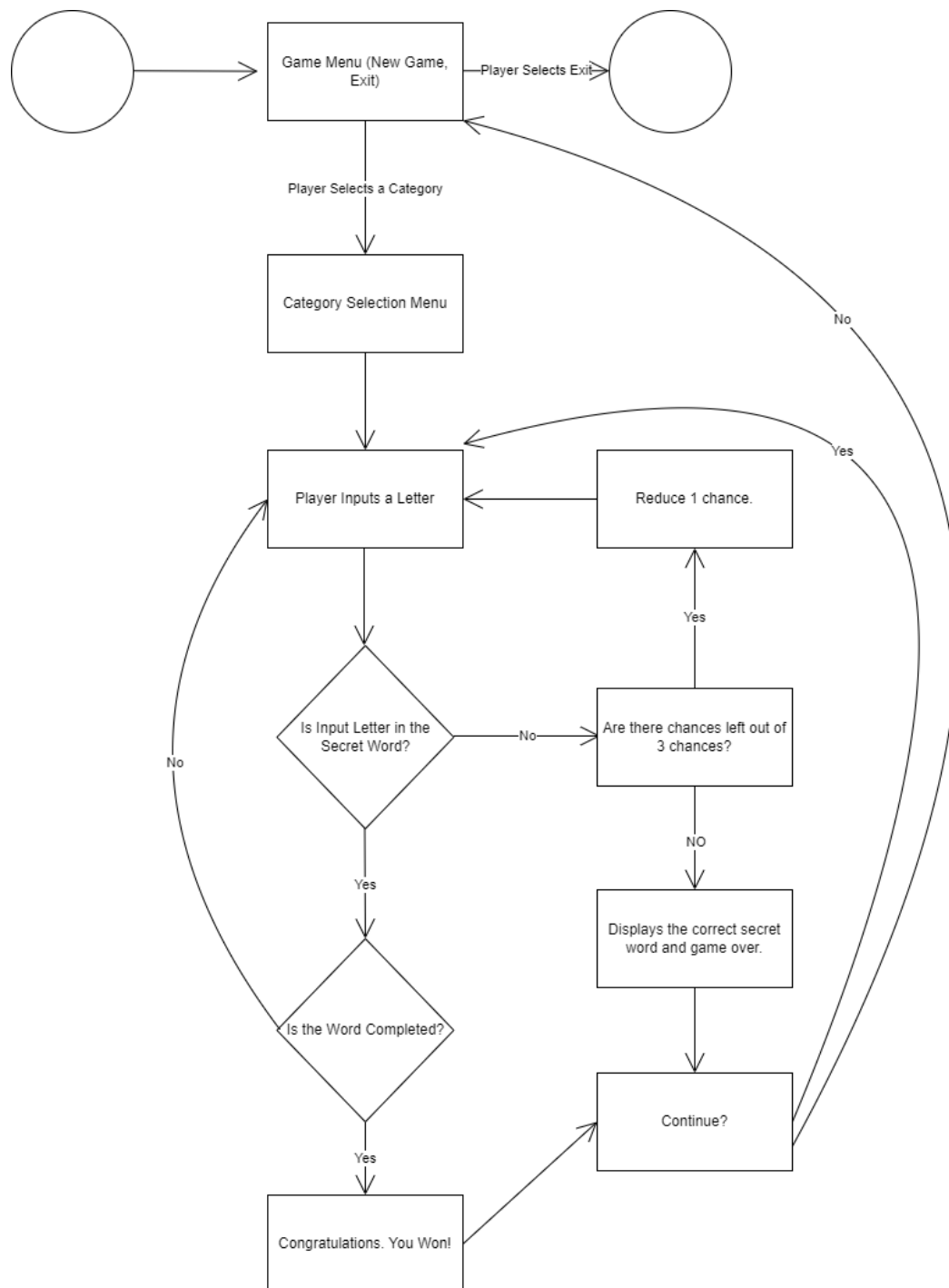


Fig 5. Entity-Relationship Diagram of the Filipino iteration of Hangman Mobile Game

Project Development

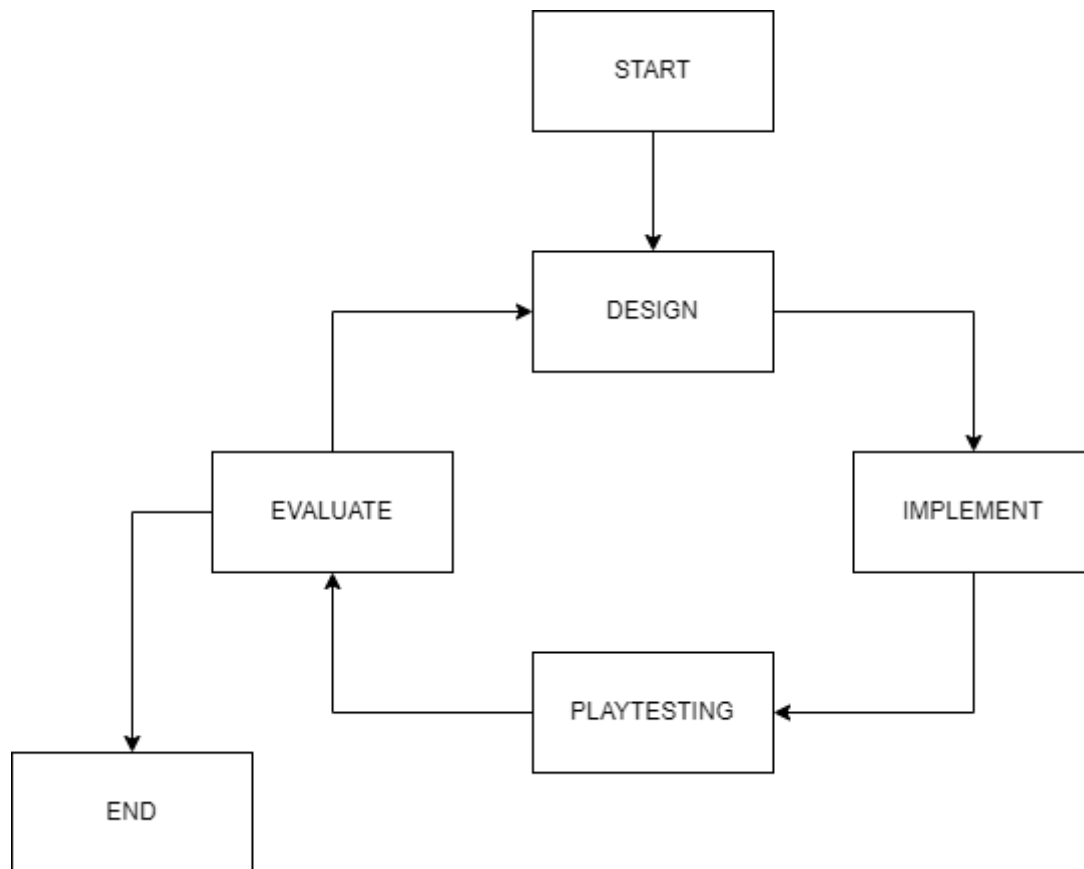


Fig 6. Spiral Development Model

Figure 4 shows the spiral cycle of the Spiral Model which will serve as a guide in developing the mobile game application. According to the diagram, there are four (4) primary phases of development consisting of many iterations namely: design, implement, playtesting, and evaluate.

Design. The researchers design the project's what's and how's throughout the first stage of the development cycle. The specifics of the tools being used (such as the framework and programming languages) will need to be decided by the researchers in order to solve the project's difficulties.

Implement. The second stage of the development cycle is where the researchers put the design's specifics into practice.

Playtesting. The researchers will test whether the application's design implementation is successful throughout this phase. identifying potential issues along the process and their fixes.

Evaluate. The researchers will assess whether the application complies with the project requirements after the testing phase is complete. The researchers will come up with more potential solutions to the issues encountered during the playtesting phase if it were insufficient or if there were more prospective add-ons.

Project Evaluation

The ISO 25010 standard will be utilized as a comprehensive framework to evaluate and determine the suitability of the Hangman game application. ISO 25010, also known as the Systems and Software Quality Requirements and Evaluation (SQuaRE) standard, provides a structured approach for assessing the quality characteristics of software systems.

The process used for determining if the produced application is acceptable is detailed below.:

- Request 30 participants
- The participants will use the application
- Participants will be given a questionnaire to evaluate the application
- The researchers will collect and analyze the feedback from the participants, considering both quantitative ratings and qualitative comments.
- Based on the evaluation findings, recommendations and improvements will be made to address any identified issues or areas of improvement

POINT	SCALE RANGE	EXPLANATION
4	4.00 - 3.00	Strongly Agree
3	2.99 - 2.00	Agree
2	1.99 - 1.00	Disagree
1	1.00 - 0.99	Strongly Disagree

Table 1: 4-point Likert's Scale

Work Plan

Initiation and Planning of a Project:

- Define the project's scope, objectives, and target audience.
- Determine the Hangman game's primary features and functionalities.
- Make a detailed project plan, complete with objectives and deliverables.

Research and Content Collection:

- Conduct extensive research on Filipino culture, including language, traditions, history, and myths
- Create a collection of pertinent words, phrases, and information about Filipino culture.

Prototyping and Game Design:

- Create the user interface (UI) and overall design for the game.
- Incorporate Filipino cultural features into the visual and auditory components of the game.

Refinement of Game Content:

- Examine and improve the collection of Filipino cultural words, phrases, and trivia.

Finalization and polishing:

- Adjust the graphics, color, and sound effects of the game.
- Final testing should be performed to confirm that all aspects of the game match the specified quality requirements.

MONTH	TASK
March	<ul style="list-style-type: none"> • Initiation and Planning of a Project: Research and Content Collection
April	<ul style="list-style-type: none"> • Prototyping and Game Design
May	<ul style="list-style-type: none"> • Refinement of Game Content
June	<ul style="list-style-type: none"> • Finalization and polishing

Table 2: Work Breakdown Structure

Potential for Commercialization

The evaluation and assessment of a product's or innovation's marketability and profitability is known as its potential for commercialization. In order to determine whether a product or innovation has the potential to bring in money, draw in clients, and experience long-term economic success, a variety of criteria must be examined. This project has the potential to be sold commercially. Hangjuan is a Filipino-based hangman game. Its objective is to familiarize players with and provide an entertaining yet informative game experience about Filipino Culture. Thus, establish entertaining and challenging gameplay so the user can learn while having fun.

Measurable Benefits

The mobile game is accessible anywhere. They can use it even when there is no internet connection. It has an easy-to-use interface and is user-friendly. The game helps them become more familiar with Filipino Culture. The project's objectives include captivating and motivating participants to study, as well as teaching people about Filipino culture and spreading trivia and information.

CHAPTER 4

Results and Discussion

This chapter will explain the study's findings and its analysis. In addition to those already mentioned, the project's description, structure, capabilities, and restrictions are finished within this chapter.

Project Description

HangJuan: Development of Hangman Mobile Game for Learning Filipino Culture is a Hangman Game for Learning Vocabulary is an educational software project intended at increasing language learning and vocabulary mastering via an interactive and entertaining gaming experience. The project's goal is to create a digital Hangman game application that can be utilized by students of all ages and levels of language skill with the use of Godot Game Engine.

The objective of the project is to design a user-friendly and intuitive gaming interface in which players can guess letters to reveal a concealed phrase before a complete figure of a hanging man is generated. The game will focus on extending and developing players' vocabulary by presenting them with different Filipino words and facts related to that word.



Fig 7. Main Menu



Fig 8. Main Game

Project Structure

The HangJuan game includes features such as Main menu, Leaderboards, Player Name Input, Main Game, and Facts Distribution.

At the beginning of the game, players are presented with a visually engaging main menu, offering them the options to start the game, access the leaderboards, or exit the game. *See Figure (main menu).*



Fig 9. Input Player Name

When players select to start the game from the main menu, they are requested to provide a name that will be featured on the leaderboards, providing a personalized touch to their gaming experience. After entering the name, the game enters the main gaming mode. In this phase, the player is challenged to guess a word by inputting individual letters. A countdown of one minute

and thirty seconds is established to give a sense of urgency and excitement, boosting the pleasure of the gaming.

To keep the suspense high, players are given a limited amount of lives, usually beginning with eight. A life is deducted for each wrong letter guess. This feature creates a risk-reward dynamic, in which players must weigh their estimates against the possibility of losing their lives. Along with the lives, players start with a score of ten points, which serves as a baseline for their performance during the game.



Fig 10. Main Game and Hint System

The game has a hint tool to help players and lessen frustration. If the player's remaining lives fall below a specified threshold, such as four, they are given the opportunity to push the hint button. This action causes the system to offer helpful clues, directing the player to the correct

answer. This added assistance motivates players to continue and stay engaged with the game even in difficult situations.

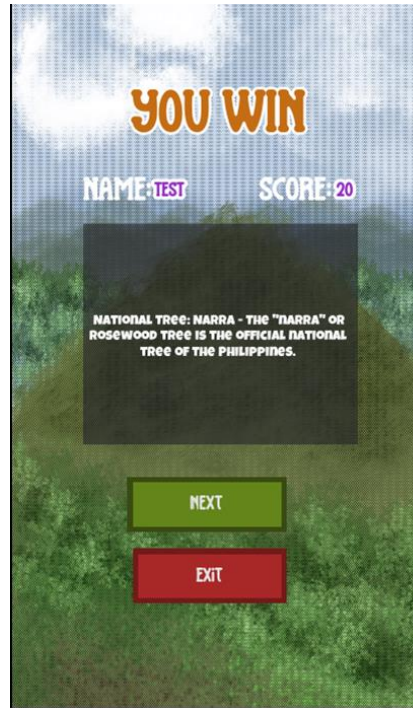


Fig 11. Win Game

If the player correctly guesses the word within the time restriction and without exhausting all of their lives, the system answers with a pleasant display. It displays intriguing facts or information about the word, adding an educational and amusing element to the gaming. In addition, the player's score is enhanced by 10 points in acknowledgment of their success, offering a real measure of growth and achievement. Following the presentation of facts and the updating of the score, the system gives the player two alternatives. To begin, players are offered the option to begin the next game, which allows them to continue their gameplay experience and face new problems. They may also quit the game, which is a simple method to take a break or end their gaming session.

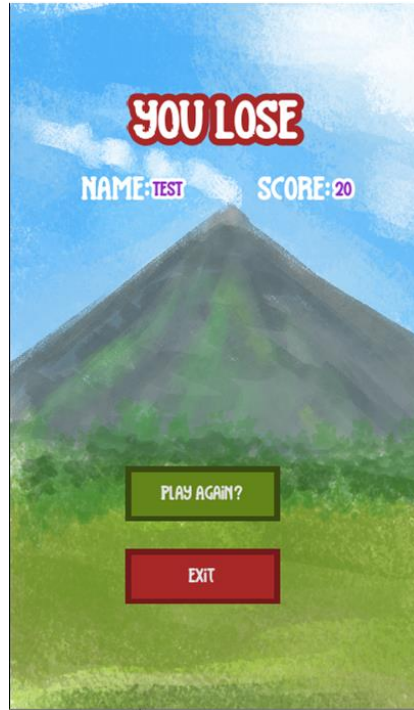


Fig 12. Lose Game

However, if the player runs out of lives or the time limit before correctly guessing the word, the system reacts with a notification indicating that the player has lost the game. This warning is accompanied by relevant visual signals to properly communicate the outcome. The player is then given two options: begin a new game, which allows them to improve their performance and try again, or quit the game, which allows them to end their session.



Fig 13. Leaderboards

The leaderboard area provides players with an overview of the best scorers in the game, displaying their names and related points. This function acts as a way of comparison and incentive, allowing users to compare their performance to others and aim for better ranks. When players visit the leaderboard, they are provided with a beautifully arranged list that emphasizes the top scores. Each entry contains the player's name, which they previously entered at the start of the game, as well as the corresponding points they have acquired over their gameplay sessions.

System Capabilities

1. **Interactive Gameplay:** The game provides players with an enjoyable and interactive hangman gameplay experience that lets them learn while having a good time.
2. **Filipino Cultural Content:** The game includes components from the Filipino culture, such as words, phrases, customs, and places, giving players an immersive education in the culture of the Philippines.
3. **Educational Value:** A useful tool for language learners, visitors, and anybody with an interest in the Philippines, HangJuan serves as an educational resource for people interested in learning about Filipino culture.
4. **User-Friendly Interface:** The mobile game's user-friendly interface is meant to make it simple for players of all ages to navigate and understand how to play.
5. **Cultural Insights:** In addition to the gameplay, HangJuan can offer more details about each word or phrase, providing context, explanations, and cultural insights to improve the player's comprehension of Filipino culture.

System Limitations

1. **Limited Coverage:** Because HangJuan focuses on hangman games and Filipino culture, it might not fully address all facets of language learning or Filipino culture. It should not be considered a complete resource, but rather an additional tool.
2. **Cultural Diversity:** Filipino culture is rich and diverse, embracing numerous areas, languages, and traditions. HangJuan may not fully portray all parts of this variety, and some cultural nuances may be neglected.

3. **Technical Restrictions:** The development of the game may be affected by technical constraints such as platform compatibility, device constraints, or programming constraints. These constraints may have an impact on the overall gameplay experience or the features available.
4. **Content Updates:** As language and culture evolve, the game's content may become outdated over time. Regular updates and maintenance would be necessary to ensure the game remains relevant and accurate.
5. **Feedback and Improvement:** Continuous improvement based on user feedback is crucial for any educational game. The project team would need to actively gather user input, address bugs or issues, and incorporate user suggestions to enhance the game's effectiveness and user experience.

Project Evaluation

The total number of respondents who were evaluated by the system was 30. The respondents included 15 non-IT, CS, and IS students as well as 15 professionals outside of school. The system was evaluated by respondents using 10 questions based on Functionality, Performance/Usability/Efficiency, and Maintainability/Portability/Design of ISO 25010.

Table 3. Responses to Functionality by Non-IT Students

	Mean	Interpretation
Functions are required for the systems are implemented	3	Highly Acceptable
The system input and output are accurate	3	Highly Acceptable
The system Modules are working and connected properly	3	Highly Acceptable
There is a substantial system security	3	Highly Acceptable
Average	3	Highly Acceptable

In the Functionality Evaluation, responded with a highly acceptable evaluation for the “Functions are required for the systems are implemented” (100% responded with highly acceptable) . For the accuracy of the system’s input and output under the same category, the respondents evaluated the system to be highly acceptable (100% said highly acceptable). The system’s Modules evaluation for working and connected properly, the respondents said the system is highly acceptable (100%). For the system's substantial security evaluation under the same category, the respondents said highly acceptable (100% said highly acceptable).

Table 4. Responses to Functionality by Professionals

	Mean	Interpretation
Functions are required for the systems are implemented	3	Highly Acceptable
The system input and output are accurate	3	Highly Acceptable
The system Modules are working and connected properly	3	Highly Acceptable
There is a substantial system security	2.93	Highly Acceptable
Average	2.98	Highly Acceptable

In the Functionality Evaluation, responded with a highly acceptable evaluation for the “Functions are required for the systems are implemented” (100% responded with highly

acceptable) . For the accuracy of the system’s input and output under the same category, the respondents evaluated the system to be highly acceptable (100% said highly acceptable). The system’s Modules evaluation for working and connected properly, the respondents said the system is highly acceptable (100%). For the system's substantial security evaluation under the same category, the respondents said highly acceptable (93.33% said highly acceptable while 6.67% said acceptable).

Table 5. Responses to Performance, Usability and Efficiency by Non-IT students

	Mean	Interpretation
The system is error free(syntax, logic, run-time)	2.93	Highly Acceptable
Easy to operate and remember	3	Highly Acceptable
Allows effective use of system resources	2.93	Highly Acceptable
Average	2.95	Highly Acceptable

In the Performance, Usability and Efficiency Evaluation, it responded with a highly acceptable evaluation for the “The system is error free (syntax, logic, run-time)” (93% responded with highly acceptable and 6.67% said acceptable) . For Easy to operate and remember, under the same category, the respondents evaluated the system to be highly acceptable which is (93.33%) and acceptable (6.67%). Under the same category, allows effective use of system resources responded with highly acceptable (93.33%) and acceptable (6.67%)

Table 6. Responses to Performance, Usability and Efficiency by Professionals

	Mean	Interpretation
The system is error free(syntax, logic, run-time)	2.93	Highly Acceptable
Easy to operate and remember	3	Highly Acceptable
Allows effective use of system resources	3	Highly Acceptable
Average	2.97	Highly Acceptable

In the Performance, Usability and Efficiency Evaluation, it responded with a highly acceptable evaluation for the “The system is error free (syntax, logic, run-time)” (93.33% responded with highly acceptable and 6.67% said acceptable) . For Easy to operate and remember, under the same category, the respondents evaluated the system to be highly acceptable which is 100%. Under the same category, allows effective use of system resources responded with highly acceptable (100%).

Table 7. Responses to Maintainability, Portability and Design by non-IT students

	Mean	Interpretation
Easy to expand and modify to adapt to new changes	2.93	Highly Acceptable
Can run on different environment	2.93	Highly Acceptable
The GUI design used was clear, neat and visible.	2.8	Highly Acceptable
Average	2.88	Highly Acceptable

In Maintainability, Portability and Design, the respondents evaluated the system for its “Easy to expand and modify to adapt to new changes” and found out that it is highly acceptable

(93.33%) and acceptable (6.67%). Under the same category, the system was evaluated to see if it can run on different environment and the system got 93.33% for highly acceptable, and 6.67% for acceptable. For “The GUI design used was clear, neat and visible”, the respondents said that the system is highly acceptable (80%) and acceptable (20%).

Table 8. Responses to Maintainability, Portability and Design by Professionals

	Mean	Interpretation
Easy to expand and modify to adapt to new changes	2.93	Highly Acceptable
Can run on different environment	2.93	Highly Acceptable
The GUI design used was clear, neat and visible.	2.86	Highly Acceptable
Average	2.91	Highly Acceptable

In Maintainability, Portability and Design, the respondents evaluated the system for its “Easy to expand and modify to adapt to new changes” and found out that it is highly acceptable (93.33%) and acceptable (6.67%). Under the same category, the system was evaluated to see if it can run on different environment and the system got 93.33% for highly acceptable, and 6.67% for acceptable. For “The GUI design used was clear, neat and visible”, the respondents said that the system is highly acceptable (93.33%) and acceptable (6.67%).

Table 9. Overall Summary of Responses

	Total Mean	Interpretation
Functionality	2.99	Highly acceptable
Performance/Usability/Efficiency	2.96	Highly acceptable
Maintainability/Portability/Design	2.89	Highly acceptable

For each category, the mean of all the responses was calculated and combined to obtain the overall mean. With a mean score of 2.99, the majority of respondents stated the system's functionality is highly acceptable. The system obtained a mean score of 2.96 in the performance/usability/efficiency category from the respondents, which is a highly acceptable response. The system scored a 2.89 total rating in the maintainability category.

The system obtained a mean score of 2.946 overall after the responses given by the participants were evaluated in terms of functionality, performance/usability/efficiency, and maintainability/portability/design.

CHAPTER 5

This chapter summarizes and concludes the findings of previous chapters' research. Included in this chapter is a summary of findings, final conclusions, and additional recommendation for those who intend to pursue studies linked to the Development of a Hangman Mobile Game for Learning Filipino Culture

Summary of Findings

The research study developed HangJuan, a mobile game that combined the classic game Hangman with educational content on Filipino culture, and found that it received a positive response from non-IT/CS/IS students and professionals outside of school. Participants enjoyed the game's interactive and user-friendly interface, and reported increased knowledge and interest in Filipino traditions, history, and language. The study highlights the effectiveness of gamified learning tools like HangJuan in engaging diverse audiences and promoting cultural appreciation and understanding. These findings emphasize the potential of mobile games as educational platforms to broaden cultural knowledge and foster connections beyond traditional educational settings.

Conclusion

In conclusion, the study "HangJuan: Development of Hangman Mobile Game for Learning Filipino Culture" properly analyzed the characteristics of functionality, performance/usability/efficiency, and maintainability/portability/design using ISO 25010 standards. The study's goal was to develop a mobile game that would allow learning about Filipino culture through an interesting and participatory experience.

The study effectively implemented a comprehensive set of features to educate users about various aspects of Filipino culture. The game's incorporation of vocabulary, phrases, and cultural knowledge provided an interactive platform for enhancing understanding. Attention to optimizing performance, usability, and efficiency resulted in smooth performance, responsive user interfaces, and user-friendly controls, enhancing the overall experience. The study also prioritized maintainability, portability, and design, ensuring future updates, scalability, and an immersive cultural experience. Overall, the research demonstrated a thorough evaluation of the HangJuan mobile game, incorporating functionality, performance/usability/efficiency, and maintainability/portability/design to create an effective educational tool for learning about Filipino culture.

Recommendation

For future researchers who have a similar project. The following recommendations are proposed to enhance the educational hangman mobile game, HangJuan, for improved player engagement, age-appropriate features, and optimization on the visual aspects of the game:

1. Implement Word Categories:

Introduce word categories for HangJuan to provide players with a clear context and theme for guessing the words. This enhancement will not only make the game more engaging but also aid in vocabulary acquisition and topic-based learning. By categorizing words into subjects such as sports, food, animals, and more, players can choose their preferred category and personalize their learning experience.

2. Explore Alternative Visualizations on the Life System for Younger Audiences:

Consider an alternative life visualization in place of the traditional hangman figure for younger audiences in an educational setting. While the current system may be suitable for older players, it may not be appropriate or appealing for younger learners. For example, a creative alternative life system could involve using a piece of food running out for every mistake. Each incorrect guess could deplete a portion of the food item, adding a sense of urgency and consequence to the gameplay. Alternatively, a character jogging or running could trip and stumble with each incorrect guess, and losing the last life would depict the character becoming too tired and unable to continue.

By implementing these recommendations, HangJuan can provide a more immersive and effective educational experience for players, especially younger audiences. The addition of word categories will enhance the game's educational value, while exploring alternative life visualization systems will ensure age-appropriate and engaging gameplay. These recommendations lay the foundation for future research and development in gamified language learning, paving the way for innovative and effective educational mobile games.

APPENDIX A

Testing Procedure

Module	Steps to be Taken	Expected Result
1. Username Module	<ol style="list-style-type: none"> 1. Start new game. 2. Game asks for username. 3. User inputs name. 4. Name is used for the next games. 5. After finishing a game, name is recorded with the score they obtained. 	<p>User should be able to start a new game and enter their chosen username whenever they start playing.</p> <p>No blank names.</p> <p>The name is recorded after every game won alongside with their scores.</p>
2. Game Module	<ol style="list-style-type: none"> 1. After inputting the name, press proceed. 2. Press button of the letters to guess word/phrase. 3. Each correct guess reveals the letter on the hidden word/phrase. Every wrong guess creates more parts of the hangman (denoting losing a life) 4. Guessing the word/phrase correctly win the game. Else game over. 5. Winning records the score and username on leaderboard. 	<p>The game runs for the user.</p> <p>When a button is pressed, the button greys out meaning it has already been pressed and no longer be repeated.</p> <p>When the guess is correct, the hidden word gets updated to reveal what letter was guessed correctly. Else the button is only greyed out and the next part of the hangman gets shown denoting loss of a life point.</p> <p>Winning the game shows the user to a trivia screen based on the word/phrase they guessed correctly. Their scores will be recorded in the leaderboard. Else its just a game over screen with the option to exit or try again.</p>
3. Words database Module	<ol style="list-style-type: none"> 1. Start a game. 2. Check that the words/phrases are randomized each game. 3. Check by inputting letters what the words/phrases are from the database. 	<p>Each game should have randomized words/phrases that are obtained from the database.</p>

APPENDIX B
Evaluation Procedure

Characteristics	Rating		
A. Functionality	3	2	1
1.1 Functions are required for the systems are implemented			
1.2 The system input and output are accurate			
1.3 The system modules are working and connected properly			
1.4 there is a substantial system security			
B. Performance/Usability/Efficiency			
2.1 The system is error free(syntax, logic, runt-time error)			
2.2 Easy to operate and remember			
2.3 Allows effective use of system resources			
C. Maintainability/Portability/Design			
3.1 The system is easy to expand and modify to adapt to new changes			
3.2 The system can run on different environment			
3.3 The system Graphical User Interface design used was clear, neat and visible enough to be seen by the user.			

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Secondary

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Skills

Knowledge in C, C++, Python, Godot
 Digital Arts

Affiliations

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Projects

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STEM Strand
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Skills

Proficient in Python, C, C++, GDScript

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Skills

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2018 – 2020

Junior High School

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Calamba

2014 – 2018

Skills

Proficient in MS Word, Basic Graphic Design, Basic knowledge in HTML, C, C++, Python

Affiliations

Tertiary

N/A

Secondary

N/A

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