DEVELOPMENT OF MOBILE ALMANAC:

A FILIPINO HERITAGE AND CONTEMPORARY EVENTS

A Capstone Project

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CHAPTER I

INTRODUCTION

Project Context

In the current educational setting, a significant challenge is emerging, Grade 5 students are becoming increasingly disengaged from Araling Panlipunan. Although the subject plays a vital role in shaping national identity and historical awareness, it is often taught through outdated, non-interactive methods such as rote memorization, textbook reading, and teacher-centered lectures. These traditional approaches no longer align with the interests and learning styles of modern students growing up in a fast-paced, technology-driven environment. At Camias North Central Elementary School, this issue is particularly evident. Teachers report that many Grade 5 students describe the subject as "boring" or "hard to understand." In special class, students are frequently observed using their personal mobile phones to access videos, apps, and other media indicating their strong familiarity with and preference for digital, interactive tools. This disengagement is further compounded by the lack of localized and updated learning resources in public schools. At Camias North Central, there is a shortage of Araling Panlipunan books, many of which are outdated or must be shared, limiting students' ability to review or study independently. A study by Gonzales and Hermosa (2023) revealed that 70% of Grade 5 students in public schools lost interest in Social Studies due to non-interactive teaching methods and the absence of technology integration. In addition, Cabansag (2021) pointed out that only 15% of educational apps currently used in Philippine classrooms are

localized or culturally relevant. This means most tools do not reflect Filipino heritage or current events, further weakening students' connection to the subject. However, emerging research shows promising alternatives. Buenaflor (2024) found that 85% of Grade 5 students responded positively to game-based Araling Panlipunan activities, showing increased motivation and deeper understanding. Similarly, Arville and Batula (2023) reported that over 60% of Grade 5 learners performed better when lessons included digital visual tools like graphic organizers and interactive media. In response to these challenges, we developed the project Mobile Almanac: A Filipino Heritage and Current Events, a mobile application designed specifically for Grade 5 students at Camias North Central Elementary School. The application reimagines the traditional almanac as an interactive, game-based platform filled with culturally relevant quizzes, activities, and digital reviewers. It leverages students familiarity with smartphones, to boost engagement and deepen their understanding of Philippine history , culture, and current events. Serving as both a supplementary and alternative educational tool, the application aims to make learning more accessible and effective for young learners.

Purpose and Description

The Development of Mobile Almanac: A Filipino Heritage and Contemporary Events is a mobile application made to help Grade 5 students learn about Philippine history, culture, and current events in a fun and interactive way by integrating game-based quizzes, puzzles, colorful visuals, animations, sound effects, and interactive lessons that allow students to actively engage with the content rather than just read or memorize it. The main goal of the application is to help students understand and appreciate being

Filipino by giving them lessons and activities that match their level. The application has learning modules that talk about national heroes, important events in history, traditions, festivals, and current issues in the country. These lessons use easy-to-understand words, colorful pictures, and interactive features to help students enjoy learning and understand the topics better.

One of the best parts of the application is the educational games, which include quiz, puzzle, and crossword. The quiz gives multiple-choice questions to check what students remember from the lessons. The puzzle lets students solve scrambled images of national heroes to help them recognize important symbols of heroes. The crossword game gives clues that students must solve using words related to history, culture, and events, helping them build vocabulary and think more critically.The app also has an online reviewer where students can go back and review the main ideas of each topic. The system is easy to use and designed so that Grade 5 students can learn on their own or with little help. This mobile almanac is a modern tool that helps students learn more about being Filipino while also improving their thinking and learning skills through fun, educational activities.

Objective

General Objectives

To develop a mobile almanac application that promotes learning of Filipino heritage and contemporary events for Grade 5 students of San Miguel North Central School.

Specific Objectives

The development of the mobile almanac application for San Miguel North Central School should be able:

1. Develop a mobile Almanac application that showcase important facts about the Philippines history, traditions, and current news;
2. Integrate fun learning activities such as gamified quizzes, puzzles and crossword to help Grade 5 students in their learning.
3. Provide an online reviewer that help students to study and recall what they've learned about Filipino culture and current events.
4. Provide an evaluation of the app's quality using the ISO 25010 standard to ensure it meets user expectations, works properly, reliable, and runs smoothly.

Scope and Limitation

This project involves the development of a mobile application specifically designed for Grade 5 students. The primary goal is to support their education by providing engaging content about Filipino heritage, history, culture, and current events. The application will feature a section on Filipino heritage that includes key historical events, national symbols, traditions, and cultural practices. It will also have a contemporary events section that offers regularly updated news and achievements relevant to the Philippines. To enhance student engagement, the application will feature an interactive quiz game with multiple difficulty levels, a challenging puzzle game, and

an exciting crossword game. These interactive activities are designed to reinforce learning while keeping students entertained and motivated to explore more about Filipino history, culture, and current events. The application is intended for use on Android smartphones, ensuring accessibility for students with mobile devices. Additionally, an internet connection will be required to update current event content and keep the information accurate and up to date.

However, the project has certain limitations. The application will only be compatible with Android devices and will not support iOS or desktop platforms. Internet access is necessary for content updates, and offline usage will be limited to materials that have already been downloaded. The application is focused solely on Philippine History topics and does not cover other academic subjects such as Filipino, Math, Science, or English, etc. To maintain the accuracy of the content, students will not have the ability to add or edit information within the application lastly, during the initial implementation phase, the application will be tested and used only by Grade 5 students of San Miguel North Central School.

Significance of the Study

This project is important because it supports learning and cultural awareness among elementary students by using technology. The following are the key stakeholders and how they benefit from the project:

To Students: This project provides students with a fun and interactive way to learn about Filipino history, culture, and current events. It helps improve their

understanding of important topics in a format they enjoy, making learning easier to remember and more engaging.

Teachers: can use the application as a supplemental learning tool to reinforce lessons in Araling Panlipunan and related subjects. It saves time in preparing reviewers and provides ready-made quizzes that help assess student performance.

School Administrators: The application supports the school's educational goals by promoting the use of digital learning tools. It can also serve as a model for future educational innovations within the school.

Parents: benefit because the application gives their children a safe and educational tool on mobile devices. It also helps students study at home, making learning more accessible outside the classroom.

Future/Developers: This project can serve as a reference or inspiration for future projects that combine education and technology. It shows how mobile applications can be used effectively for localized and subject-specific learning.

Definition of Terms

Visual Studio Code (VS Code) - A source code editor.

Android Studio – An official Integrated Development Environment (IDE) for building native Android applications.

Flutter - Is a cross-platform UI toolkit for building natively compiled applications for mobile.

Dart - Is the programming language used to write flutter applications.

Admin - A person responsible for managing and organizing a tasks within a system or company.

Mobile Almanac – A digital version of a traditional almanac designed for mobile devices, containing organized information such as historical facts, cultural topics, and current events specific to the Philippines.

Filipino Heritage – Refers to the cultural traditions, values, customs, symbols, and historical experiences that define the identity of the Filipino people.

Contemporary Events – Current or recent news, happenings, and developments in the Philippines that are relevant to students' understanding of society and their environment.

Quiz Game – A game-based assessment tool included in the application that allows students to answer multiple-choice questions on Filipino history and culture in a fun and competitive way.

Reviewer – A digital tool or module in the application that provides students with simplified study materials to help them prepare for quizzes.

Grade 5 Students – The primary users of the application, specifically students in the fifth grade at San Miguel North Central School.

Android Devices – Mobile devices running the Android operating system, which are the primary platform for which the application is developed.

CHAPTER II

REVIEW OF RELATED LITERATURE

In a study by Magno et al. (2019), an Android mobile application titled HAPinoy was developed to promote Filipino culture and traditions among Grade 1 to 6 pupils. The app featured cultural topics such as the Bahay Kubo, Karinderya, Paaralan, and Pinoy Fiesta, presented through interactive lessons, mini-games, voice and text narration, and character selection. Developed using Unity and programmed in C#, the app aimed to provide an engaging learning environment. It was evaluated using the Mobile Application Rating Scale (MARS) and obtained a mean rating of 3.54, interpreted as "Highly Acceptable." This study supports the effectiveness of gamified mobile learning tools in educating young learners about local culture, offering a strong foundation for similar educational applications targeting values, history, or heritage learning.

Masangkay et al. (2023) developed KaSAYSAYan, an Android-based adventure trivia game aimed at enhancing students' learning in Philippine History. The application was designed using Unity and C# with educational content based directly on the elementary curriculum modules. Through interactive and gamified experiences, students were provided with engaging learning tools that led to improved assessment scores—rising from a mean of 3.65 (pre-game) to 6.13 (post-game) out of 9. The game was evaluated using ISO 25010:2011 standards, showing high scores in areas like reliability, portability, usability, and performance efficiency. These results affirm the effectiveness of

game-based learning in improving students' interest, motivation, and academic performance in history subject.

Mathematics plays a crucial role in both everyday life and academic success, forming the foundation for logical reasoning, problem-solving, and informed decision-making. Despite its importance, many students experience anxiety or fear when faced with mathematical concepts, often stemming from a lack of confidence or negative past experiences. In an increasingly technology-driven world, the demand for critical thinking and computational skills is rapidly growing across various fields, from science and engineering to finance and data analysis. While technology is sometimes seen as a source of distraction in the classroom, it also presents valuable opportunities for enhancing education. When implemented effectively particularly through game-based learning platforms technology can increase student engagement, motivation, and comprehension. Interactive and gamified approaches to learning math encourage active participation, foster a positive learning environment, and promote deeper cognitive development. Thus, integrating thoughtful technological tools into math education can transform students' attitudes toward the subject and better prepare them for the challenges of the modern world."

The Philippine History Mobile Game is a proposed game development system that allows the creation of a mobile game application which contains a historical events and figures to be introduced to the users while playing. The game application's genre is strategical which also promotes critical thinking that helps an individual in building their

next move and also historical so that players will also be learning some pointers of the past while playing and not just they learn in school. The proposed game development contributes to the field of information technology as it will be used for educational purposes, not just for entertainment that is commonly recognized when it comes to games, but the technology that is used both for fun and learning. As the players start the game, they will be exposed to the historical figure since the game content are all related to the past events of the Philippines. This game can be used as an alternative tool to learn history by the teachers since all game objects have references and information of what that object is related to the past

Elementary students, being at the peak of their childhood, naturally enjoy play-based activities. This stage presents an opportunity to integrate values education more effectively through game-based learning. "Ugaling Pinoy: A Mobile Learning Game Application About Edukasyon sa Pagpapakatao (Values Subject)" is a mobile game developed to teach young learners good manners and right conduct in various situations and settings. The study aimed to create a values-based learning game for elementary pupils and assess its impact on their understanding of the subject. The system was developed using Basic for Android for programming, Adobe Photoshop for graphics design, and Adobe Flash for animation to make it more engaging and visually appealing. Validation was carried out by ten (10) IT experts and five (5) values education teachers. A total of 30 elementary pupils were selected as respondents through purposive sampling. The researchers employed mean, percentage, and t-test as statistical tools for data

analysis. Results showed that the developed learning game had a positive effect on students' learning in values education. It was concluded that the system was user-friendly and demonstrated excellent performance. Moreover, the study emphasized the benefits of using learning games as an educational intervention, highlighting their potential in enhancing pupils' good manners and right conduct.

The Increasing number of students who are hooked on playing online mobile games (OMG) is alarming. As such, this study was realized to address the problem. This study assessed the gaming profile towards OMG and its relation to the academic performance of the engineering students of Eastern Visayas State University Tanauan Campus (EVSUTC). Specifically, the study investigated the correlation between student's number of hours spent on playing OMG (at school and home), commonly played OMG (at school and home), reasons for playing OMG and attitudes on playing OMG with academic performance utilizing Eta and Pearson r correlation analyses. A random sample of 134 student respondents were selected through purposive sampling of those who are playing OMG using their mobile phones. Descriptive correlational research design was utilized and a validated survey instrument was employed to gather the needed information. The findings revealed that majority of the students played mobile legends and spent mostly 2 hours playing OMG for a reason of boredom. The overall attitudes of the students on playing OMG were interpreted as Less Favorable (M=2.58, SD=1.13). Out of the independent variables being set in the study, the number of hours spent on playing OMG at home (r=-0.188, p=0.039) and commonly played OMG at school

(r=0.203, p=0.045) were found significantly correlated with student's academic performance. Hence, the students' time spent on playing OMG at home and the type of games that students played at school have significant bearing to their academic performance. As such, delimiting student's usage of internet can be made to address the problem

With the rapid advancement of modern information technology, game-based methods have emerged as a promising new teaching approach in higher education institutions. Despite their growing application, comprehensive reviews of educational games and gamification strategies in higher education remain limited, though such reviews are highly informative for the field. This study employs the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) methodology and draws on two major academic databases—Web of Science (WoS) and Scopus—to systematically review 31 articles published between 2014 and 2023 that meet predefined inclusion criteria.This study has analyzed studies about educational games in higher education Institutions. The paper is to analyze the latest utilization of gamification learning approaches for higher education lectures. Databases, namely WoS and Scopus, have been used and 31 articles were selected according to the PRISMA method. The main results emphasize the benefits and challenges of gamified learning approaches in higher education. The findings show that gamification learning approaches can bring positive behavioral and attitude change to learners and inspire motivation improvement, skill improvement ,engagement improvement, and knowledge gain of them in higher learning

context, and eventually lead to better learning outcomes. Besides, it can not only encourage learners' improvement, but also contribute to educational development. But in the meantime, the findings point out that only the cooperation and efforts of learners, educators, and institutions can solve the issues in gamification learning process and lead to effective game based learning.

In the current technology-driven era, digital game-based learning (DGBL) has emerged as a practical approach for enhancing mathematics achievement among young students. It is believed that digital drill-and-practice educational games can replace traditional pen-and-paper drills in mathematics education and have a better influence on incorporating postgame debriefing activities. The current study applied a quasi-experimental study mixed-method design to evaluate the differences in mathematics learning achievement and learning retention between three types of interventions of PaGamO with postgame group discussions, and pen-and-paper drills among sixth-grade elementary students in mathematics courses. Greater improvements were observed among students learning with PaGamO compared with traditional pen-and-paper drills. Positive perceptions of PaGamO among students were confirmed through semi-structured interviews. However, students who participated in postgame group discussions exhibited impaired learning retention, suggesting that the immediate effects of DGBL with postgame discussions are positive but that the delayed effects are adverse. Implications of the study findings and suggestions for future research are also provided for broader and practical application of PaGamO and postgame activities in educational settings.

One study focused on the development of a mobile game that integrates local history and cultural heritage into its storyline and gameplay. Set in the town of Kemijärvi, Northern Finland, during the 1920s, the game aims to encourage both visitors and residents to engage with the town's historical background. Designed in collaboration with history experts, the game presents local history through a narrated story, where users interact with historical locations and characters. The research outlines the game's design process, concept, and user evaluation. Key lessons highlighted include the difficulty of balancing historical accuracy with an engaging narrative and the significance of clearly identifying and involving the target user group in refining the game concept and interface. The study also underscores how cultural heritage increasingly benefits from digital technologies. Historical content is no longer confined to books, museums, or archives; it is now accessible through the internet and smartphones. Various web services provide access to historical data, and many museums and historical organizations maintain online platforms to showcase their collections. Additionally, technology-based tools such as mobile applications offering thematic, location-based walking tours have become more common. These tools cater to a wide range of user's locals, tourists, and history enthusiasts who seek to deepen their understanding of local history and heritage.

The research topic focuses on game-based learning and its impact on education, particularly in enhancing student engagement, problem-solving skills, and collaborative learning. To explore this topic, a comprehensive literature search was conducted using peer-reviewed sources from academic journals such as the International Journal of

Technology in Education (IJTE). The sources were selected based on their relevance to game-based learning, covering aspects such as motivation, cognitive development, and educational outcomes. The evaluation of sources involved analyzing key studies that highlighted the benefits of integrating games into the learning process, such as improving problem-solving abilities, fostering social skills, and enhancing knowledge retention. Additionally, the research examined the role of interactive and adventure-based games in promoting educational engagement. Findings from various studies suggest that game-based learning creates a dynamic and interactive environment where students develop critical thinking skills and resilience. The review also highlights the importance of balancing entertainment and educational content to ensure that students remain engaged without compromising learning objectives. Moreover, research suggests that game-based learning fosters a growth mindset, allowing students to persist through challenges and improve their academic performance. In conclusion, this literature review synthesizes existing knowledge on game-based learning, emphasizing its potential as an effective educational tool while also addressing the need for structured implementation in classroom settings.

CHAPTER III

METHODOLOGY

Environment

The Development of Mobile Almanac: A Filipino Heritage and Contemporary Events is an educational mobile application designed specifically for Filipino Grade 5 students. The client for this capstone project is Camias North Central School in San Miguel, Bulacan, represented by Mrs.Imelda R. Vargas and she assigned teacher Sir Christian G. Lim, the Grade 5 Araling Panlipunan teacher. The initial testing and pilot implementation of the Mobile Almanac application will focus solely on the Grade 5 Science class section. Currently, students in this section are learning through face-to-face classroom instruction, primarily using printed modules and textbooks. While full online learning is not implemented, some students use mobile phones at home to access educational content, creating a blended learning environment in a limited capacity. The main tools being used are printed materials, teacher discussions, and when available, personal Android devices for additional learning. However, the school faces challenges such as limited internet connectivity, lack of school-owned digital devices, and outdated learning resources. Despite these challenges, Camias North Central School supports DepEd's digital initiatives, making use of platforms like DepEd Commons and TV-based instruction when possible. These conditions make the Mobile Almanac project a relevant and practical solution for the Science class, offering an engaging, mobile-friendly educational tool tailored to the students' current environment and needs.

Requirements Specifications

This section outlines the system requirements for the mobile almanac and game platform, an interactive educational tool designed to support Filipino elementary students in learning about Filipino heritage, culture, and language through a digital almanac, quiz-based games, and reviewers. To better organize and manage data, an Entity Relationship Diagram (ERD) will be used to illustrate the database structure. It shows how different data elements such as users, quiz scores, almanac entries, and game results are connected. This helps developers design a system that efficiently handles content management, student progress tracking, and user interactions.

To ensure each user has access to the right features, the system uses an Access Control Matrix, which defines the specific permissions assigned to each role. This ensures that only authorized users can perform certain actions, such as editing content or viewing progress reports. The table below provides an overview of the permissions available to each role, which helps guide developers in setting up user-based restrictions and functionalities in the system.

Table 1. Access Control Matrix of Mobile Almanac Application

User Role	View Almanac	View Reviewer	Play Games	Add Content	Edit Content	Manage User	View Scores/ Progress
Teacher	✓	✓	✓	✓	✓	✓	✓
Student	✓	✓	✓				✓

Table 1 will show the Access Control Matrix, which outlines the specific actions each user role can perform within the Mobile Almanac, such as managing content, accessing learning materials, and playing educational games. It serves as a reference for developers when implementing permissions and restrictions for each role in the system.

Operational Feasibility

The proposed system fits perfectly with the Department of Education's efforts to modernize learning through digital resources. Since many students and teachers in public schools already use Android smartphones or tablets, implementing the app will be simple and effective. The app is designed to be easy to use, allowing students to navigate through it independently with little to no training. Teachers can easily incorporate it into their classroom routines, using it to support lessons or recommend it for students to use at home. The system includes features like the interactive almanac, games, and online Reviewer, all designed to make learning fun and engaging. Whether in a formal classroom setting or during at-home study, the app provides a flexible learning experience. Real-time syncing ensures that students' progress, quiz results, and updated content are always current. Additionally, the admin dashboard allows teachers to manage and update content without needing any technical skills. This makes the app a useful tool for both students and teachers, supporting a wide range of learning needs in an easy-to-manage way.

Technical Feasibility

The system is built using visual studio code, flutter, and firebase, which makes it capable of handling everything from the design to the backend and testing. It's optimized to work smoothly on low- to mid-range Android devices, making it perfect for use in public school environments where resources can vary. By combining firebase for real-time syncing with SQLite for local storage, the app can work both online and offline, which is especially important in areas with unreliable internet access. This setup ensures the app remains functional and accessible to all students, no matter their internet connection.

Schedule Feasibility

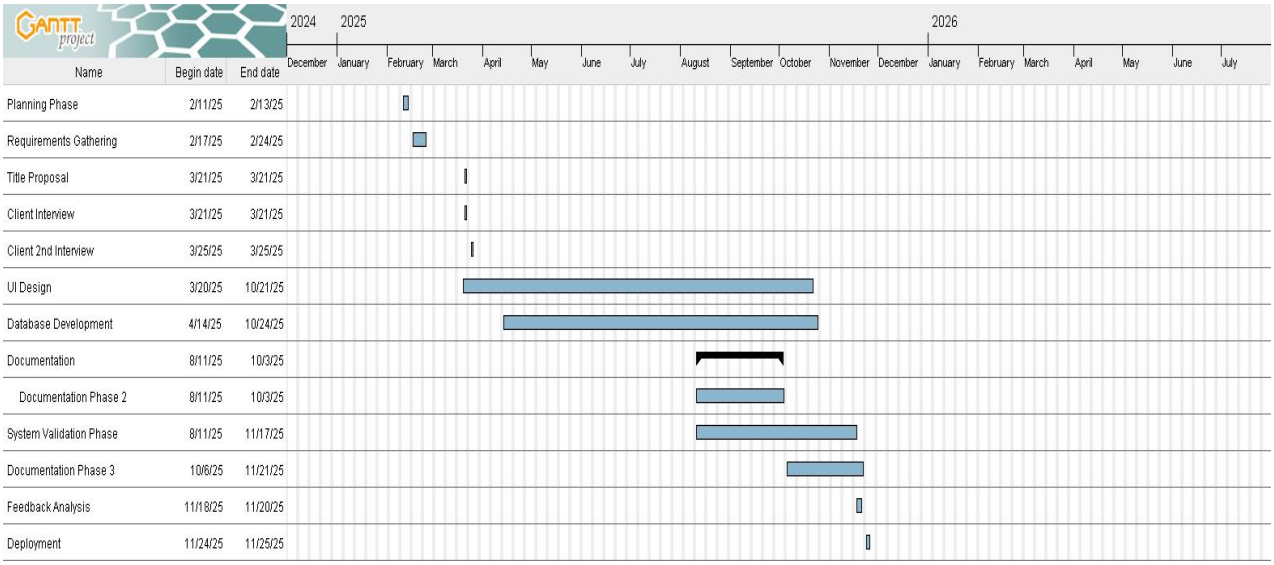

Figure 1. Mobile Almanac System Gant Chart

Figure 1. Show the project begins with a Planning Phase from February 11 to 13, where the team defines the project's scope, timeline, and roles. This is followed by Requirements Gathering from February 17 to 24, which involves meetings and discussions with stakeholders to understand the functional and technical needs of the

system. On February 25, the team submits a Title Proposal to formally present the initial idea and the team defended the title that we propose. To refine the concept and ensure alignment with stakeholder expectations, Client Interviews are conducted on March 21 and March 25. These discussions provide valuable insights that guide the design and development phases. Starting March 20 until October 21, the team focuses on UI Design, creating wireframes and user experience flows to define how users will interact with the system. Alongside this, Database Development runs from April 14 to October 25, where the backend architecture, data models, and storage systems are built. After consolidating feedback and refining the project direction, the Final Title Proposal is submitted on May 8. As the technical work progresses, the team prepares Documentation from April 12 to August 9, outlining system architecture, features, and user guides. The project then enters Phase 2 Development from August 10 to October 5, where major components of the system are developed and integrated. The System Validation Phase takes place from October 5 to November 17, where the system undergoes thorough testing to ensure functionality, performance, and reliability. In parallel, Phase 3 Development continues from October 6 to November 22, allowing for final enhancements, feature completion, and integration. After validation, a Feedback Analysis period from November 18 to 20 is used to review test results and implement final improvements. Finally, the system is launched during the Deployment Phase from November 24 to 25, marking the official release and delivery of the fully functional application.

Economic Feasibility

Table 2. Cost Benefit Analysis

Items	Traditional Cost (Yearly)	Proposed System Cost (Yearly)	Estimated Savings
Printed Quizzes & Review Materials	₱3,000	₱300	₱2,700
Educational Games	₱1.500	₱0	₱1,500
Physical Storage	₱800	₱100 - ₱200	₱600 - ₱700
Domain Developer Fee(part-time)	₱0	₱1000(one-time)	₱0
Total	₱5,300	₱1400 - ₱1500	₱4,800 - ₱4900

The table above illustrates how the Mobile Almanac and Game Platform will significantly reduce the school's instructional material costs for the Grade 5 Filipino subject. Traditionally, teachers use printed quizzes, worksheets, and review materials which cost the school approximately ₱3,000 per year. With the new system, these materials will be digitized and accessed through the app, lowering the yearly cost to around ₱300, mainly for occasional printing or technical maintenance .Additionally, educational games such as crossword, puzzle, and quiz activities are currently facilitated using printed paper or board setups, costing an estimated ₱1,500 per year. With the integration of these games into the mobile app, the cost of these learning tools will drop to zero, as students will engage with them directly on the device. The system also reduces the need for physical storage, such as folders and cabinets used to keep student outputs, saving the school up to ₱800 annually. Once the platform is in place, digital storage will handle most content, cutting the cost to just ₱100–₱200 yearly. In total, the school is

expected to reduce its learning material expenses by up to 90%, while improving the efficiency and interactivity of Filipino language instruction.

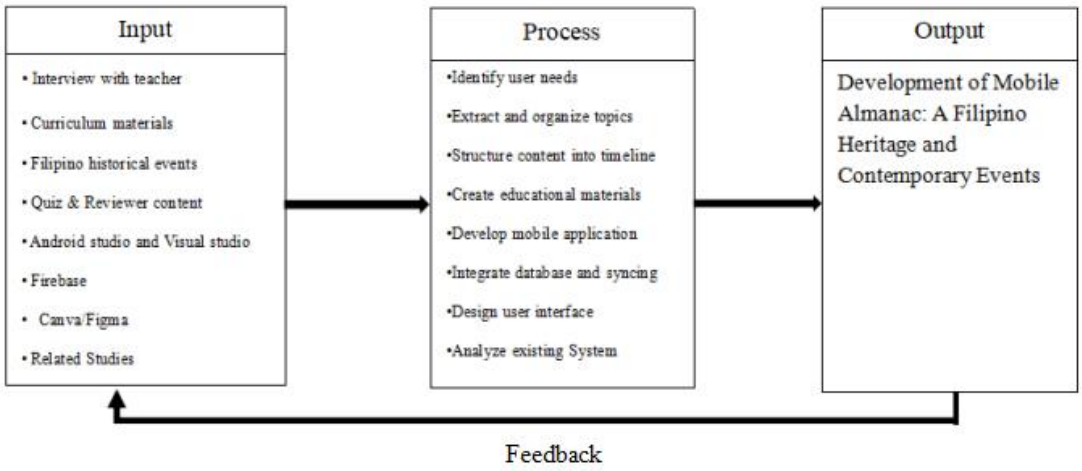

Figure 2. Conceptual Framework

Figure 2. Conceptual Framework Based on the Input-Process-Output (IPO) Model for the Capstone Project: "Development of Mobile Almanac: A Filipino Heritage and Contemporary Events." This framework illustrates the systematic flow from key inputs through developmental processes to the resulting educational mobile application, designed to promote Filipino heritage awareness and engagement with contemporary events. This model illustrates how the different elements of our project interact to achieve the intended educational outcomes. In the Input stage, we collected essential information and resources needed to develop the application. These inputs included educational content about Filipino history, culture, and language, which served as the foundation for the almanac, quizzes, and review materials. We also consulted teachers and students to understand their learning needs and preferences, ensuring that the content would be appropriate and engaging for elementary-level users. Technical inputs such as Android Studio for app development, Firebase for real-time database and cloud functionality, and

Canva or Figma for UI/UX design were identified as the necessary tools to build the system. Additionally, we reviewed related literature and similar educational apps to guide our development approach.

In the Process stage, we are currently organizing historical content and creating quiz and reviewer materials. We are also designing the app interface and developing the system using Android Studio and Firebase. Once the modules are completed, we will conduct testing and gather feedback from students and teachers for evaluation and improvement. After making the necessary adjustments, we will prepare the application for implementation. In the Output stage, we aim to produce a fully functional online mobile application that will help elementary students learn more about Filipino heritage through an interactive almanac, quizzes, and a reviewer. The system is intended to promote cultural appreciation and improve engagement in Filipino subjects.

Development Model

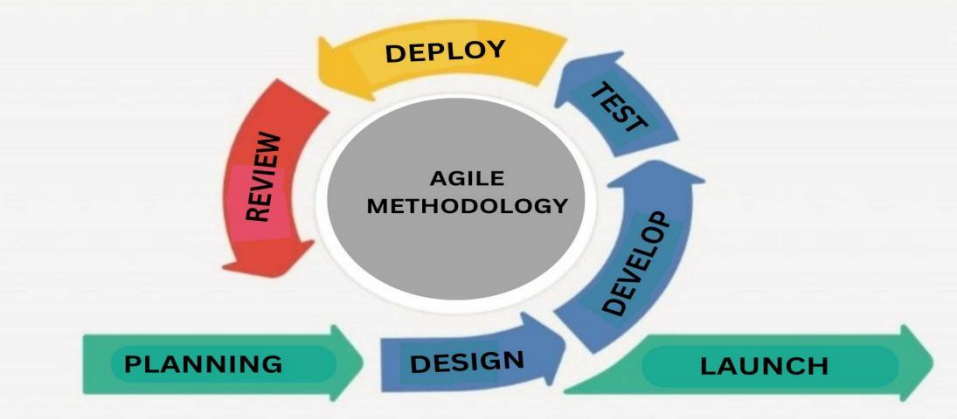

Figure 3. Agile Method

Development Method

The development of the Online Mobile Almanac: A Filipino Heritage and Contemporary Events followed the agile software development methodology, specifically the Scrum framework. Agile was chosen because of its iterative and flexible nature ideal for educational mobile apps that benefit from ongoing testing and refinement. The approach allowed the team to break the project into manageable sprints and adjust as needed based on design reviews and internal feedback.

The process began with gathering insights from teachers, which were organized into a product backlog a prioritized list of features such as the Quiz Game, Video Modules, and Online Reviewer. This backlog guided development to ensure the features aligned with learning goals and user needs. Interface designs and wireframes were created using Canva and Figma to help the team visualize how students would eventually interact with the app. While student testing has not yet been conducted, the app is being prepared for pilot testing in a school setting to gather feedback and finalize improvements.

Design of Software, System, and/or Processes

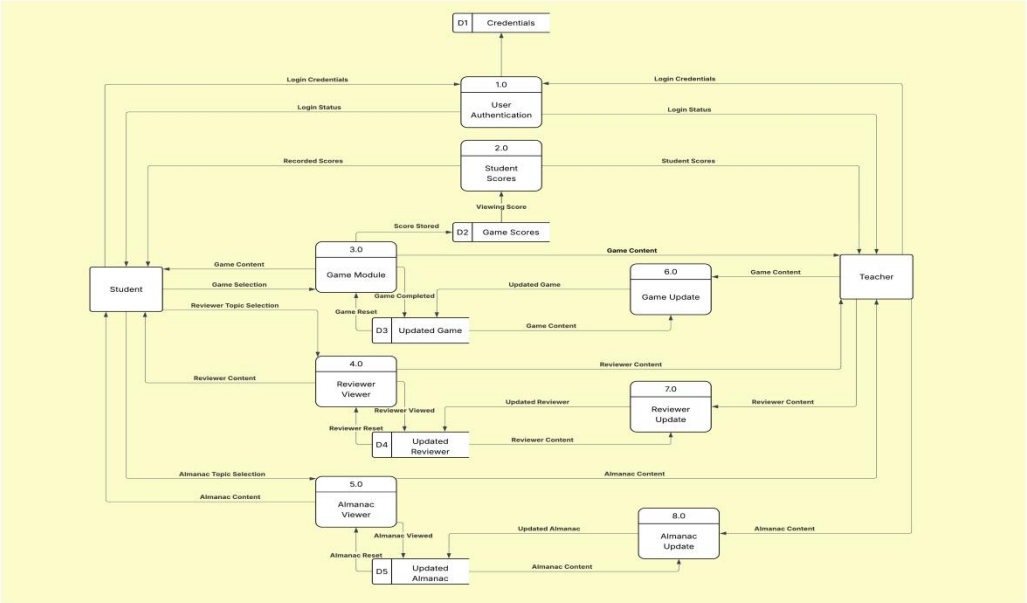

Figure 4. Data Flow Diagram

Figure 4 illustrates the System Flow Diagram of the Development of Mobile Almanac: A Filipino Heritage and Contemporary Events, an educational application that blends interactive learning with gamified experiences.

The system supports two user roles: Student and Teacher, each accessing different functionalities based on login credentials validated via the Login Authentication process. Upon successful login, Users can explore various parts of the platform. These include viewing the Almanac (cultural/educational articles), accessing the Reviewer (study materials), and playing different Games. The games are initiated through the Play Game interface, where users select a game type via the Games module, followed by choosing a Game Difficulty level. The result of the game is tracked and recorded through the Game Score interface, enabling users to monitor their own progress. Each game session contributes to a comprehensive data log that is accessible through the View

Reports/Logs component. This feature supports transparency and performance tracking, forming the basis for feedback and potential improvements. Additional user-side options include accessing Settings to personalize the experience, and Log Out to end a session securely. Users can also update their profile information directly, reflecting changes in their stored data. The Admin has elevated privileges, including the ability to manage user accounts, view user progress, and update educational content (both Almanac and Reviewer materials). All administrative actions, including content updates and user monitoring, are routed through the Admin Panel, where detailed analytics and logs can be accessed via View Reports/Logs. These logs ensure that all system activities are properly recorded and traceable. The diagram illustrates critical system relationships, such as “SignUp/Login,” “Play Game,” “View Score,” “Manage User Accounts,” and “Update Content.” These connections clarify the flow of interaction within the platform seamlessly integrating learning, gameplay, and administrative control. Together, these components contribute to a dynamic and engaging learning environment that promotes cultural awareness and educational progress through interactive digital tools.

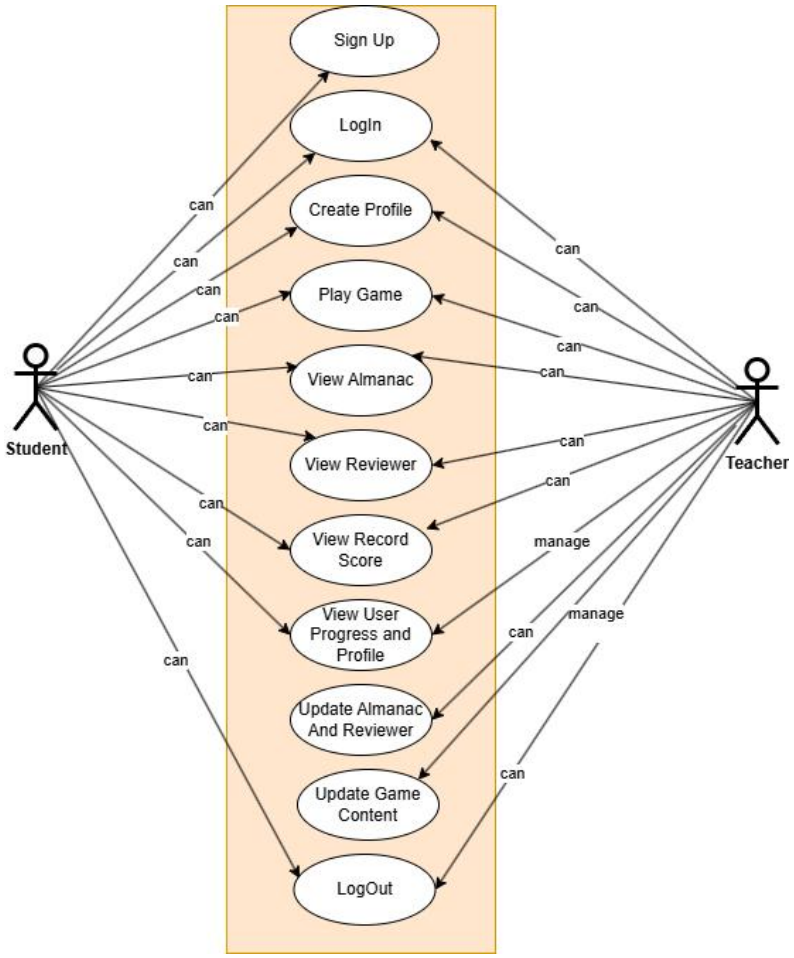

Figure 5. Use Case Diagram

Figure 5 illustrates the Use Case Diagram of the Development of Mobile Almanac: A Filipino Heritage and Contemporary Events, an educational platform that integrates interactive games and culturally enriching content. The system features two main user roles: User and Admin, each with defined interactions and access to system functionalities.

The User represents the student or learner who engages with the platform's educational tools. Upon launching the application, the user can Sign In or Log In to access personalized content. Once authenticated, users can participate in gamified activities through the Play Game feature, enhancing their knowledge of Filipino heritage in an engaging format. To support deeper learning, users can access the view reviewer

module, which contains curated study materials, and the view almanac, which offers historical and contemporary educational content. After playing games, users can monitor their performance through the view record score function, which provides feedback on their progress. Users also have the ability to manage their experience by navigating to setting, where they can customize preferences, and create profile, which allows them to input personal information and upload a profile picture. The logout feature ensures a secure end to each session. The admin serves a supervisory role within the system. In addition to accessing public content such as the reviewer, almanac, and score records, the admin can perform privileged operations such as view user progress and profile, allowing them to oversee individual learning outcomes and manage user data. Admins are also responsible for update almanac and reviewer, enabling them to revise, improve, or add new educational materials to keep the content relevant and accurate. Like users, admins also have access to the logout function for secure session termination. Each use case is visually represented within the system boundary, highlighting how different actors interact with the Mobile Almanac's features. The directional arrows indicate the flow of interaction, ensuring clarity on the responsibilities and capabilities of both users and administrators. Together, these use cases support a structured, user-friendly educational experience that combines personal learning journeys with administrative oversight—fostering both engagement and continuous content development within the Mobile Almanac platform.

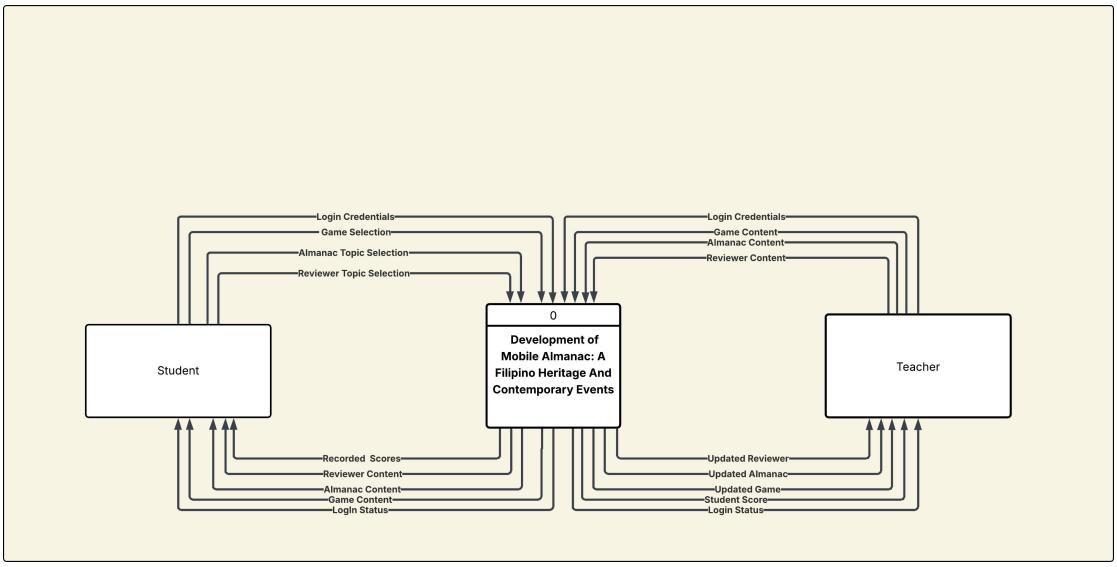

Figure 6. Context Diagram

Figure 6 presents the Context Diagram of the Development of Mobile Almanac: A Filipino Heritage and Contemporary Events, a mobile-based educational platform that combines interactive content delivery with gamified learning experiences. The diagram identifies three primary components: Student/User, Admin, and the central system labeled Mobile Almanac, which serves as the main processing unit for all interactions. The Student/User entity represents learners who interact with the application to access educational content and participate in game-based learning activities. Key user-initiated processes include signing up or logging in, playing educational games, viewing personal scores, accessing almanac and reviewer content, and updating personal profiles. For each action, the Mobile Almanac processes the request and returns appropriate responses, such as profile information, game results, almanac content, and login success notifications. These interactions support personalized learning and progress tracking. The Admin entity plays a supervisory and content management role. Admins access the system to log in, manage user accounts, edit game questions, update almanac and reviewer materials, and

monitor game scores. In response to these actions, the Mobile Almanac provides administrative feedback such as user lists and status updates, login authentication, updated game content confirmation, and user score reports. This enables effective oversight, content quality control, and system integrity. At the center of the diagram, the Mobile Almanac system acts as the core processing engine. It facilitates communication between users and the system, stores and delivers educational content, handles user data securely, and maintains up-to-date game and reviewer content. It ensures that user inputs are appropriately processed and that system responses are accurate and timely. The connections in this context diagram illustrate the data exchanges represented by labeled arrows that define how external entities interact with the system. These data flows enable seamless integration of content delivery, user engagement, and administrative control, thereby aligning with the system's goals of providing an interactive, informative, and well-managed educational experience.

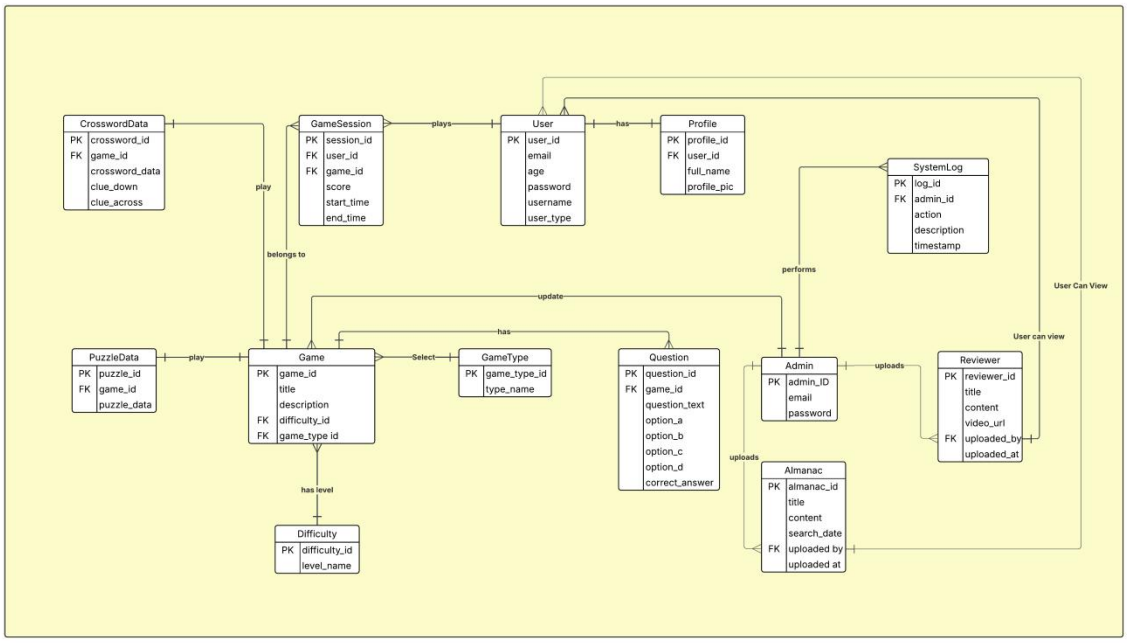

Figure 7. Entity-Relationship Diagram

Figure 7 shows the Entity-Relationship Diagram of the Mobile Almanac System, a gamified educational platform with three main content categories: quiz, puzzle, and crossword.

The system accommodates two user roles admin and user each identified by their respective IDs: admin_id and user_id. Users are stored in the User entity, which contains fields such as email, username, age, password, and user type. Each user can have one associated Profile, identified by profile_id, which includes additional personal information like full name and a profile picture. Users engage with the platform by playing various Games, each represented in the Game table. A game is uniquely identified by game_id and contains attributes such as title, description, and references to its difficulty level (difficulty_id) and game type (game_type_id). Difficulty levels are defined in the Difficulty table with entries such as "Easy", "Medium", or "Hard", while game types are specified in the GameType table as either "Quiz", "Puzzle", or "Crossword". Each instance of gameplay by a user is logged in the GameSession table, which includes the session_id, the user who played, the game played, score achieved, and the start and end times of the session. This supports the system's tracking of user performance and engagement. The Game table connects to specialized data entities depending on the type of game: Question is linked to quiz games and stores multiple-choice questions along with correct answers. PuzzleData supports puzzle-type games by storing the puzzle content. CrosswordData handles crossword-type games, containing the clues for across and down, and the final solution. In addition to games, the platform includes a Review Section and a digital Almanac to support learning: The Reviewer table holds reviewer content, optionally with a video URL, the uploader's ID, and the upload

timestamp. The Almanac table provides educational articles or information, each with a title, searchable date, and content. Administrative tasks are handled by Admins, stored in the Admin table with credentials such as email and password. Admins also monitor system activity via the SystemLog, where each log entry includes the admin ID, action taken, description of the event, and a timestamp. This helps maintain transparency and control over platform usage. The relationships within the diagram, such as “plays,” “uploads,” “logs,” “contains,” and “categorized as,” clarify the structure and flow of data. They enable a cohesive interaction between users, games, learning materials, and administrative oversight, resulting in a comprehensive and manageable educational game system.

Development

Software Specification

In the software specification, the tools to be used for the development of the system include: Android Studio for the development environment, Firebase as the real-time database, and Canva or Figma for designing the user interface. The programming language to be used is Flutter, Android Studio, and Visual Studio Code Android development. The application will be designed to run on Android devices and will be accessible online by elementary students for learning Filipino heritage through interactive modules.

Hardware Specification

To run the system smoothly, the following minimum hardware specifications are recommended to ensure that both the development and user-side operation of the application will not experience performance issues:

Table 3. Hardware Specification

Device	Specification
Laptop/Desktop	Intel Core-i3 processor or higher
Memory	4gb, 8gb ram and higher
Storage	At least 250gb Hard disk or ssd
Android Phone	Helio p35 processor or higher
Memory	At least 4gb ram or higher
Storage	At least 500mb free space

Program Specifications

The Online Mobile Almanac will consist of three main modules: the interactive almanac, games, and online reviewer. The almanac will provide updated historical and cultural information, the quiz module will offer gamified learning with scoring, and the reviewer module will help students study various topics related to Filipino heritage. Each module will be developed with usability and age-appropriateness in mind to suit elementary students.

Programming Environment

Front End:

The front end will be developed using android studio. The interface will be created with Figma or Canva to design user-friendly and educational visuals. The app will be structured with reusable layouts and designed for responsiveness on a variety of Android devices.

Back End:

Firebase will be used as the real-time database for storing and syncing data such as quiz results, almanac entries, and reviewer content. This setup allows dynamic content management, making it easy for updates to be reflected immediately in the app.

Testing and Evaluation

To ensure that the Development of Mobile Almanac: A Filipino Heritage and Contemporary Events functions correctly and meets the needs of its users, multiple phases of testing will be conducted: unit testing, integration testing, and system testing. These tests will focus on all interactive game modules: Puzzle, Crossword, and Quiz, as well as the reviewer and almanac features.

Unit Testing

Unit testing will be done on each individual game module. The Quiz Game will be tested for question randomization, scoring, and answer validation. The Crossword Game will be tested for grid generation, clue accuracy, and user

input validation. The Puzzle Game will be tested for drag-and-drop functionality and correct placement logic. Each game will be verified to ensure it runs properly on its own, with no crashes or visual errors.

Integration Testing

After testing each module individually, integration testing will check how the games interact with other parts of the system, especially the database. For example, completed quizzes should save scores to Firebase, puzzle or crossword completion data should be stored for progress tracking, and all modules should access shared resources such as student profiles and content updates. This ensures that the system operates smoothly as a whole.

System Testing

The entire application will be tested on multiple Android devices to verify full functionality across screen sizes and operating system versions. System testing will simulate real-world usage students navigating through the app, playing the games, accessing the reviewer, and interacting with the almanac. The app should respond quickly, load data correctly, and transition smoothly between modules.

ISO 25010: A Comprehensive Guide to Software Quality

The system will be evaluated based on the ISO 25010 software quality standard to ensure it meets user expectations and technical requirements. The following

characteristics will be assessed through user feedback, testing observations, and survey forms:

Functionality – All game modules (Puzzle, Crossword, and Quiz) must perform their intended tasks, such as recording scores, validating answers, and displaying learning content correctly.

Performance Efficiency – The system must load quickly and handle transitions smoothly across different devices without noticeable delay or lag.

Usability – The interface must be simple and engaging for elementary students. Instructions, buttons, and visuals should be intuitive for young learners.

Reliability – The system should operate without crashing, errors, or data loss—even during extended usage or multiple game attempts.

Maintainability – The system must allow easy content updates, such as adding new quiz questions or events in the almanac without breaking existing features.

Portability – The application should work consistently across various Android devices and screen sizes, especially on commonly used student smartphones.

Evaluation Plan

After development, the app will be distributed to selected users including students, teachers, and IT professionals. A walkthrough and APK installer will be shared, followed by an evaluation form based on ISO 25010. The form will include Yes/No questions and comment sections to assess each module (Quiz,

Crossword, Puzzle, Reviewer, and Almanac). Feedback from users will guide the final revisions of the system.

Implementation Plan

Once development is completed, the application will be uploaded online for use. A link will be shared with users along with a walkthrough video to guide them. The developers will assist in user onboarding to ensure the app is used effectively. The system administrator, designated by the client, will oversee ongoing maintenance and content updates**.**

REFERENCE

Ai,Juo,Pan., Yea,Tzu,Yuan.,Pau,Nan,Chuo.,Incorporating PaGamO and Postgame Group Discussions into an Elementary Mathematics Course: An Experimental Study.

https://doi.org.10.1177/21582440251329698

http://.www.researchgat.net

Arar, R. G., Ibon, K. S., & Matuguina, C. M.Philippines History Mobile Game: A Proposed Game Development System. Eastern Visayas State University Ormoc City Campus.

https://www.studuco.com

Cajigas, J., Cortez, L., Bañares, C. M., Canding, A. E., Fernandez, M. C., & Gregorio, G. R. HaPinoy: Reviving Filipino Culture and Traditions through Android Application for Grade 1 to 6 Puppils.

https://www.researchpublish.com

Centeno,Criselle,J, Masangkay, Miguel,T., Mendoza, Hannah,Rose,S., Mercado,Mark, Anthony,S.,Nulud,Marygrace,D.,Paxheco,Ma Sofia,I.,

https://doi.org/10.30574/wjarr.2023.18.3.1105

Cruz, D. A. N., Dela Cruz, J. M. V. R., Manio, A. C. Y., Pascual, J. H. T., & Santos, C. J. P. (2022). TryGo: A mobile game application in PreCalculus (Undergraduate thesis). Bulacan State University., https://www.scribd.com/document/640760265/TryGo-A-Mobile-Game-Application-in-Precalculus

Eduardo Edu,C., Cornillez,Jr.,Jessie Richie,Naval ,delos Santos,Vicente,D.,Carillo,Jr., International Journal of Innovative Technology and Exploring Engineering. *https://www.doi.org.10.35940/ijitee.A4788.029420* *https://www.researchgate.net*

Elina ,Luuro.,Petre,Hannula.,Emilia,Launne.,Sanni, Mostonen.,Exploring Local history and Cultural heritage through a mobile games. *https://doi.org.10.1145/3365610.3368411* *https://www.researchgate.net*

Gao, M., Md Yunus, M., & Rafiqah M. Rafiq, K. (2025). Educational games and game-based approaches in higher education: A systematic review (2014–2023). International Journal of Academic Research in Progressive Education and Development, 13(1). *https://doi.org.10.6007/IJARPED/v13-i1/20555*

Jeremias,E .,Obina,Joseph,B.,Gabe,Shery Mae,P.,Angcon,

Bhlyzyr Thryz,R.,Diaz,Math App Utilization .

https://www..doi.org.10.46827/ejes.v9i9.4459

https://www.researchgate.net

Marites D. Escultor., Laura S. Moises,Maria Mrjorie V. Ugaling Pinoy: A Mobile Learning Game Application to Enhance Learning in Values Subject of Elementary Pupils

https://doi.org.10.1145/3365610.3368411Figure

https://www.researchgate.net