

LEARNING ABC'S: AN ALPHABET LEARNING SYSTEM FOR CHILDREN

A Proposal

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for the degree Bachelor of Science in Information Technology

By

Cole, Manuel Jr. C.

Dacoco, Christian Lloyd B.

De Castilla, Justin L.

Labajo, Louie Jay P.

Sali, Amir Alden F.

Mr. Paul S. Ngujo

Adviser

December 2024

APPROVAL SHEET

This Research/Capstone Project Study titled **LEARNING ABC'S: AN ALPHABET LEARNING SYSTEM FOR CHILDREN** prepared and submitted by Louie Jay P. Labajo, Christian Lloyd B. Dacoco, Justin L. De Castilla, Amir Alden F. Sali, Manuel C. Cole Jr. has been examined and is recommended for approval and acceptance.

RECOMMENDED:

Paul S. Ngujo

Adviser

Alexander Y. Bucol, Ed.D.EM

IT Research Coordinator

APPROVED by the Examining Tribunal on *Proposal Hearing* with a group verdict of _____ on August 1, 2024.

GLEND P. BRAZIL, MIT

Chairman

Virginia B. Verdun, MCS

Member

Ms. Christine M. Gepiga

Member

Ms. Jesieca C. Reyes

Technical Expert

ACCEPTED and APPROVED in partial fulfillment of the requirements in Bachelor of Science in Information Technology.

Janette Q. Tanquis, Ph.D.TM.

Dean, CCS

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The Researchers

DEDICATION

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CHAPTER 1

INTRODUCTION

Rationale of the Study

Learning ABC is an innovative mobile application that enhances teacher and student learning. By leveraging mobile technology, this app not only aids students in their studies but also assists teachers in refining their teaching methods and effectively monitoring student progress. In today's digital age, there is increasing concern about children's growing reliance on technology, which could negatively affect their academic performance. Learning ABC addresses this issue by transforming online time into a productive and educational activity.

Learning ABC offers three well-structured educational phases, each tailored to provide children with accessible and engaging content. The app features interactive games, such as voice-recognition exercises for pronunciation, number sequencing, and color identification activities. These games make learning enjoyable and captivating, keeping children engaged while they develop essential skills. Learning problems are commonly observed in various educational settings. While most students experience occasional challenges in formal learning environments, some face persistent and widespread problems. These challenges are often referred to as learning disabilities, specialized learning disorders, or special educational needs (Krämer et al., 2021). Booton et al. (2023) note, "Children increasingly use mobile touchscreen devices for leisure and learning at a critical stage in their language development. Smartphone and tablet ownership is rising, with up to three-quarters of 4-year-olds in the USA owning their mobile device and children in the UK increasingly using these devices instead of laptops or desktop computers." By age three, many children can independently operate these devices, opening up opportunities for self-directed learning. As these devices become ubiquitous, learning can extend beyond traditional classroom environments.

Age plays a significant role in how children use devices. Among those aged 9 to 11, 73% use a desktop or laptop, compared to 54% of children aged 5 to 8 and 16% of those under 5. Similarly, 68% of children aged 9 to 11 use gaming devices, compared to 58% of those aged 5 to 8, 25% of children aged 3 to 4, and only 9% of children aged two or younger. Tablet usage is also higher among older children, with 80% of parents of 5 to 11-year-olds reporting use, compared to 64% of parents with 3 to 4-year-olds and 35% of parents with children aged two or younger. At this young age, children are proficient with gadgets, which can lead them to access inappropriate content, such as online gambling inadvertently. Therefore, parental supervision is essential to protect children from negative influences (Marzuki et al., 2021). Rudnova et al. (2022) found that "the results show that the children's behavioral and emotional characteristics served as predictors

of parental mediation. Limited time spent on social networks or screens and low social media addiction and happiness levels predicted parental support."

Conversely, extensive screen time and low social media addiction predicted parental control. Three groups of children were identified based on different parental mediation approaches. The happiest children were those whose parents practiced facilitative mediation. Instructional mediation was associated with a higher likelihood of social media addiction, while selective mediation resulted in less addiction but more time spent on devices.

Gonzalez et al. (2023) observed a growing dependence on technology, raising concerns about its impact on children's physical and cognitive development. A cross-sectional study examined the relationship between media usage and cognitive function among school-aged children. Findings indicated that children who spend more time on smartphones, tablets, and other electronic devices are more likely to experience expressive speech delays. It aligns with concerns that children's extensive use of gadgets could lead to addiction, distracting them from their studies and hindering their academic focus. According to Bautista (2024), the Philippine Department of Education (DepEd) anticipated that the average scores of Filipino students in crucial subjects such as reading, mathematics, and science would not see significant improvement. This prediction was confirmed as scores remained consistently low compared to students from other countries participating in the latest Programme for International Student Assessment (PISA) cycle. Despite various efforts to improve educational standards in the Philippines, progress has needed to be faster, underscoring the need for ongoing and potentially restructured interventions to address the systemic challenges in the country's education system.

Young children often use mobile devices in public settings, leading to varying levels of engagement and interaction. These devices can be educational tools and distractions, influencing children's social interactions and learning opportunities. Understanding the dynamics of mobile device use among young children is crucial, as it highlights early exposure to technology's benefits and potential drawbacks. For instance, when parents co-use devices with their children, it can enhance the educational value of digital content. However, solitary use may lead to excessive screen time and decreased physical activity. This rationale builds on these findings by exploring strategies to optimize mobile device use for young children, ensuring it supports their development and learning. It will examine best practices for parental involvement, appropriate content selection, and balanced screen time to create guidelines that maximize the positive impacts of mobile device use in both public and private settings. This will provide valuable insights for parents, educators, and policymakers aiming to harness the potential of technology while mitigating its risks. Zulueta (2024) highlights growing concerns in Cebu City regarding children's access to explicit content via

mobile devices. The increased use of these devices has raised alarms among parents and educators about exposure to inappropriate material. A Google survey revealed that while most Filipino parents (87.4%) feel confident discussing online safety with their children, 53.2% struggle to find the right moment for these conversations—a significant increase from 2022. The survey also found that 61% of children had encountered inappropriate content online, underscoring the prevalence of this issue. The rapid growth in young children's use of mobile devices in public places has significant implications for their engagement and development. Ginsburg (2021) emphasizes that children's interactions with mobile devices can vary widely, with immersion sometimes leading to distraction and reduced parental interaction. However, when parents co-use with their children, it can foster better engagement and learning opportunities. This dual nature of mobile device use underscores the importance of balancing screen time in public settings. Understanding the impact of mobile devices on young children is crucial for their social and cognitive development. Research shows that co-using devices with parents can enhance children's engagement, making the experience more interactive and educational. However, excessive solitary use can lead to adverse outcomes, such as diminished social interaction and attentiveness. These findings highlight the importance of parental involvement and the context in which devices are used to ensure that screen time positively contributes to children's development.

Objectives of the Study**General Objective:**

This study aims to analyze, design, and develop an android-based application for nursery children at Saint Dominic Savio International School.

Specific Objective:

1. Identify the current learning course in terms of:
 - 1.1. processes, and
 - 1.2 problems encountered
2. Determine techniques to be utilized in the proposed system about:
 - 2.1 interactive lessons
 - 2.2 assessment
 - 2.3 progress tracker and star ratings
3. To identify system functionalities and features that will maximize the learning of the child
4. Evaluate the level of acceptability of the proposed system

Scope and Limitations of the Study

This study focuses on designing, developing, and implementing a platform to enhance engagement, communication, and learning within the Learning ABCs program at Saint Dominic Savio International School.

This project introduces a platform with unique features designed to enhance the Learning ABCs program at Saint Dominic Savio International School. It includes a User Profile Management feature for teachers and students and a Lesson Creation feature for unlocking pre-made lessons. It is specifically tailored for mobile devices and is available for download on the Play Store.

The system includes various essential features. A Progress Tracker will monitor students' advancement by awarding stars based on their performance. Voice Recognition technology will recognize clear speech from students, although it does not accommodate children with disabilities. The system is specifically designed for children without special needs. An Internet connection is required for mobile device usage, as the system does not support offline functionality. Quizzes and activities will incorporate a semi-gamified approach to evaluate children's learning and knowledge, with performance ratings to help teachers identify areas that need improvement. The system focuses on teaching basic primary and secondary colors to avoid overwhelming children with more complex color concepts, and it covers numbers from 1 to 10, ensuring that students first learn number names and writing before progressing to number sequences. This platform is designed exclusively for children, with supervision primarily provided by teachers and occasionally by parents.

Significance of the Study

The significance of this research lies in its potential to facilitate the rapid acquisition and enhancement of fundamental skills in children, particularly in speaking and listening. The study aims to deliver practical learning content that supports early education by teaching children basic alphabets and pronunciations. By leveraging smartphones—often used for entertainment—the application seeks to maximize learning opportunities while keeping children engaged.

Additionally, the app provides safe, educational content, reducing the risk of exposure to inappropriate material found in other applications. As the Thomas B. Fordham Institute (2020) highlighted, feeling secure and valued is crucial for a child's development. This application aims to foster a positive relationship with children, making it a child-friendly resource. According to Oracy Cambridge (2021), children learn to speak through listening, and effective communication involves sharing information and ensuring understanding through collaborative dialogue.

Children: The study is designed to assist children who face challenges with letter pronunciation and listening skills, providing them with tailored support to enhance these abilities.

Teachers: The study offers educators significant benefits by enhancing teaching strategies and supporting early childhood education. The application serves as a modern teaching tool that can enrich the instruction of basic language skills, making the learning process more dynamic and engaging. By integrating this technology, teachers can create an interactive learning environment that aligns with children's use of smartphones for entertainment. The app helps teachers address specific pronunciation and listening comprehension needs, thereby supporting their students' overall language development.

Parents: Parents will find the study valuable as it provides a safe and educational alternative to other digital entertainment options. The application lets parents ensure their children engage with secure and beneficial content. It also enables parents to participate actively in their children's early learning, reinforcing the app's lessons through daily interactions. This involvement strengthens the parent-child relationship and promotes a collaborative approach to education, where parents and children can practice language skills together.

Researchers: This study will provide valuable data on early childhood education and technology integration. It will deepen their understanding of these issues and offer insights into potential solutions.

Future Researchers: Future researchers will benefit from this study as it will serve as a reference or guide for their investigations, offering insights into the importance of early educational technologies and their impact.

DEFINITION OF TERMS

| | |
|--------------------------------|--|
| Color Recognition | <p>The application will feature lessons and assessments aimed at helping children identify and distinguish colors.</p> <p>Advanced assessments will involve tasks where children must recognize and differentiate between combinations of colors.</p> |
| Gamification | <p>This refers to the use of game-like elements and principles to enhance systems, services, organizations, and activities, aiming to motivate and engage users by replicating the enjoyable experiences of playing games.</p> |
| Learning ABC's | <p>This is the name of the mobile application designed for children, specifically focusing on early education.</p> |
| Mobile-Based | <p>This term describes the use of mobile devices or technology as a platform for various applications and services.</p> |
| Motivation and Interest | <p>The application is designed to increase motivation and interest through interactive lessons that are engaging and enjoyable, ensuring that children learn effectively while having fun.</p> |
| Number Sequence | <p>The application will provide lessons on numbers and their importance in helping children understand numerical values in various contexts, such as counting, basic arithmetic, and everyday use. Interactive activities will support the development of numerical literacy, which is crucial for mathematical understanding.</p> |
| Stress Pronunciation | <p>Involves emphasizing specific syllables or words to make them stand out in speech.</p> |
| Unsafe Contents | <p>Refers to potentially harmful material found on social media or other internet sources that children might encounter while browsing without parental supervision.</p> |
| Voice Recognition | <p>This feature in the application will assess and rate the child's pronunciation of letters by recognizing their speech and providing feedback through a star rating system.</p> |

CHAPTER II

REVIEW OF RELATED LITERATURE AND STUDIES

This chapter primarily presents different research and existing studies to collect relevant topics and knowledge related to the study. It contains a review of related literature, a conceptual framework, related literature, and a comparative matrix to portray the differences and relevance of each piece of literature to the proposed study.

Related Literature

Accessible Learning Content

In today's digital era, where the internet is central to daily life, parents, caregivers, and society must protect children from explicit online content. Unrestricted access to such material can significantly damage children's physical, emotional, and psychological well-being. This research emphasizes creating a safe online environment to support healthy development and preserve childhood innocence. Shahid et al. (2022) highlight that gamification frameworks can boost engagement and enhance learning outcomes. Their study is grounded in the 'Theory of Auditory Perception' by Mathew Nudds and Casey Callaghan, which suggests that auditory information is understandable. Additionally, Murroj Adel Khalaf and Marwha Mahdi Kazem (2021) stress that childhood is a critical developmental stage where behaviors, habits, and attitudes are formed, and children's intense drive to explore can expose them to various daily dangers.

Enhancement of Verbal Skills

Improving verbal skills involves enhancing one's ability to communicate effectively. Strong linguistic abilities benefit various aspects of life, including academic success, professional achievements, and interpersonal relationships. The tone used in verbal communication significantly impacts how a message is received. A friendly, warm tone creates a positive impression, while a monotonous tone may seem disengaging. To emphasize key points, varying tone and using inflection can capture the audience's attention more effectively. According to Zaitun et al. (2021), the TikTok app is widely used by students to share daily activities, suggesting that integrating engaging, interactive learning media into such platforms could improve student motivation and learning outcomes. Octavianita et al. (2022) note that technology's impact on daily life and education has been transformative, making tasks more efficient and enhancing interactive learning experiences.

Dynamic Guidance

Dynamic Guidance refers to adaptable assistance to navigate complex processes or systems effectively. This Guidance adjusts based on changing conditions, user actions, or situational requirements to enhance user experiences and decision-making. It is utilized in various

applications, including software interfaces and educational platforms. Recent research, as highlighted by Bau & Mackay (2021) and Palaigeorgiou et al. (2022), shows an increasing interest in using interactive video for learning. Studies focus on the effectiveness of interactive video's functional and cognitive aspects in education.

Cognitive Growth

Cognitive growth in early childhood involves developing mental processes such as thinking, learning, problem-solving, memory, and language. This stage is crucial for laying the foundation for future intellectual abilities and academic success. LaMonica et al. (2024) emphasize that comprehensive evaluations guide the development of educational apps, ensuring their usability, acceptability, and effectiveness. When well-designed and supported by parental involvement, educational technology can positively impact early cognitive development, including literacy, numeracy, and perceptual skills.

Color Identification

The choice of colors in clothing can significantly affect appearance and mood. Wearing complementary colors enhances one's appearance by brightening the skin and highlighting features, while unfavorable colors may have a negative impact. According to Moumou et al. (2022), color perception can influence cognition and behavior, affecting how individuals feel and behave. Bright colors can enhance mood and confidence, whereas dull or mismatched colors might diminish them.

Counting Number Sequence

Children's understanding of numbers evolves as they reach appropriate developmental stages. McMillan, Johnson, and Schexnayder (2024) found that children develop a sense of number sequences, initially exploring number patterns before mastering the conventional numerical order. This research shows that numerical comprehension develops progressively, with children gradually learning the established sequence.

Conceptual Framework

The conceptual framework of Learning ABCs comprises the concepts and technology derived from related literature.

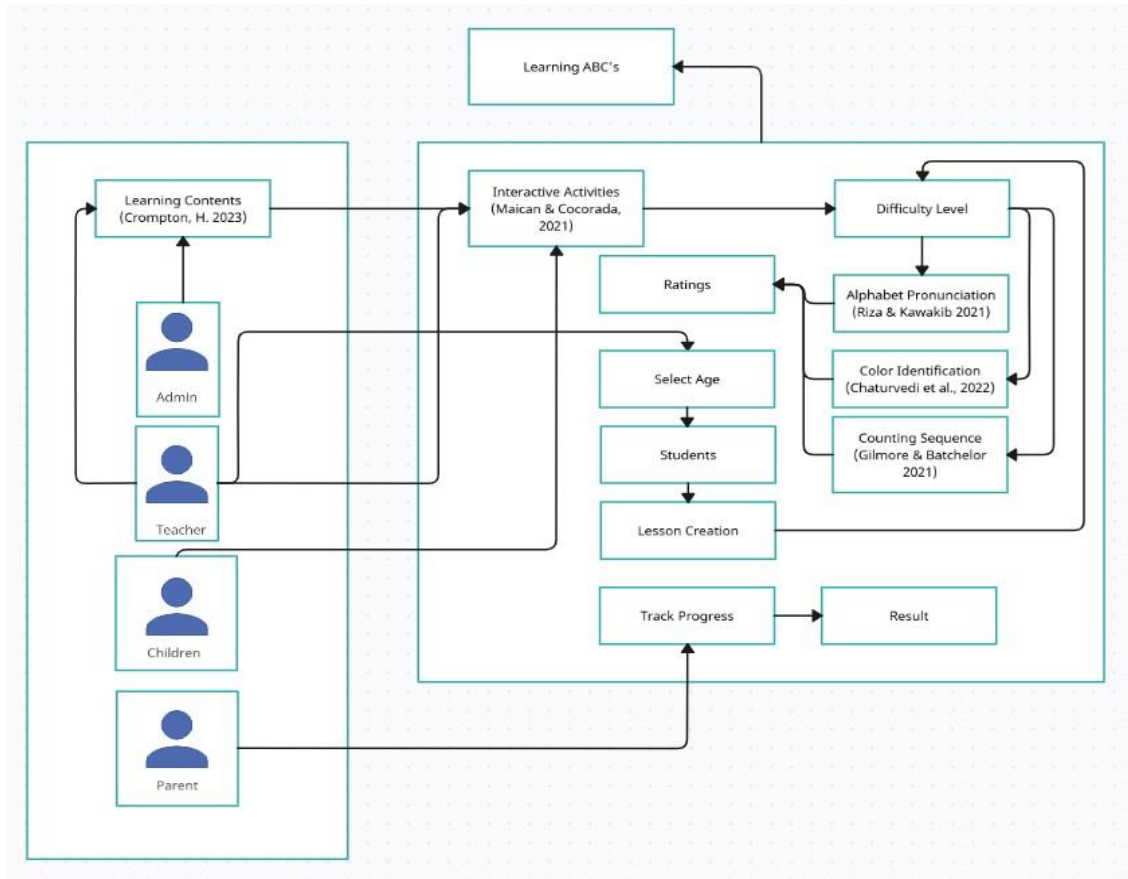


Figure 1: **Conceptual Framework of Learning ABC's**

Based on the information gathered from the related literature, the researchers created a conceptual framework that illustrates the connection between the researchers' ideas in each study. This figure represents the relationship between the associated studies and what the researchers want to achieve in this study. With the related studies and literature, the researchers should create variables that may be used to connect and expose possible solutions that will lead to the developed system.

Related Studies

This section contains 3 existing applications that are similar to Learning ABC's.



Figure 2: ABCMouse

ABCMouse.com Early Learning Academy, a flagship digital education program meticulously crafted by the renowned tech company Age of Learning, Inc., is an exceptional learning companion for young minds aged 2 to 8. This innovative platform seamlessly blends entertainment and education, offering various engaging and interactive resources (ABCMouse, 2021). This application has an advanced Progress Tracking System that could be a system feature. It has the same basic functionalities as our system, but this app caters to many learning content, like interactive games, where they can learn new words, numbers, shapes, and even planets. Unlike the learning ABC, it focuses on teaching children how a certain letter sounds and how they should pronounce it.



Figure 3: Starfall ABCs

Starfall ABC is a free app designed to teach young children the alphabet and letter sounds. It features numerous ABC animations, interactive animated books, and various reading exercises. Pick a letter, and away your child goes. Watch the twinkling arrows or letters to indicate move to the next page. Hear the letter name, hear the letter sound. This application has a lot of features and offers a variety of learning content to the children. It also works the same as Learning ABC, but it lacks a review feature, which is crucial to track the child's progress with the learning contents provided, and it also lacks real-time monitoring to monitor the activities that the child is doing at the moment.



Figure 4: Endless Alphabet

Endless Alphabet is a delightful educational app designed to introduce children to the wonders of the Alphabet in a fun and engaging way. With its colorful animated characters and interactive puzzles, this app offers a captivating learning experience beyond mere letter recognition. The Endless Alphabet has the same basic functionalities as Learning ABC, but it doesn't have performance tracking tools, which are so important since it teaches the child about basic learning contents, and the Endless Alphabet doesn't have a way to track the progress of a child also, it does not offer real-time monitoring.



Figure 5: **Khan Academy Kids**

Khan Academy Kids is an educational platform and mobile application designed for children aged 2 to 7. It offers a comprehensive range of interactive activities, games, stories, and educational content to foster early learning in literacy, math, social-emotional development, and problem-solving skills. The app employs a play-based learning approach, adapting to the child's pace and providing parents with tools to monitor progress and customize the learning experience. Khan Academy Kids is free on iOS and Android, making high-quality educational resources accessible to families worldwide.

Comparative Matrix

This table presents the comparative matrix that compares the proposed study's advantages with currently available applications in the app store. The proposed solution will offer greater insight than other applications once it is implemented. On the other hand, the app will come with a built-in recommender that could help children select the most popular activities within the app.

Table 1

COMPARATIVE MATRIX

| Criteria | Learning ABC's | ABCmouse (Early Learning Academy, 2021) | Starfall ABCs (Starfall Education, 2021) | Endless Alphabet (Learning Works, 2023) | Khan Academy Kids (Khan Academy Kids, 2024) |
|---------------------------------------|----------------|---|--|---|---|
| Voice Recognition | ✓ | ✓ | ✗ | ✗ | ✗ |
| Counting Skills and Color Recognition | ✓ | ✓ | ✓ | ✗ | ✓ |
| Rating scale | ✓ | ✓ | ✓ | ✗ | ✗ |
| Accessible Learning Contents | ✓ | ✓ | ✓ | ✓ | ✓ |
| Enhancement pronunciation skill | ✓ | ✓ | ✓ | ✓ | ✗ |
| Progress Tracker | ✓ | ✓ | ✗ | ✗ | ✓ |
| Lesson Creation | ✓ | ✗ | ✗ | ✗ | ✗ |

The comparative matrix evaluates four early learning applications: Learning ABCs, ABCmouse (2021), Starfall ABCs (2021), Endless Alphabet (2023), and Khan Academy Kids (2024), based on criteria such as voice recognition, counting skills and color recognition, rating scales, accessible learning contents, pronunciation skills enhancement, progress tracking, and lesson creation. Learning ABC excels with comprehensive features, including voice recognition, counting, and color skills, a rating scale, accessible content, pronunciation enhancement, progress tracking, and lesson creation. ABCmouse and Starfall ABCs also offer robust features but cannot create custom lessons. Endless Alphabet focuses on foundational learning but does not support voice recognition, progress tracking, or a rating scale. Khan Academy Kids provides accessible content and progress tracking but does not include voice recognition, rating scales, or lesson creation capabilities. Learning ABC is the most feature-rich option, supporting various educational activities and tools to enhance early childhood learning.

CHAPTER III

DESIGN AND METHODOLOGY

This chapter delineates the research design and methodology, outlining the research method, study procedures, environment, participants, and research instruments, including using a 5-point Likert scale. It details the various phases and tools involved in the project's development process. Several tools are employed in the Planning/Conception-Initiation Phase, such as the Business Model Canvas, Program Workflow, Validation Board (Stages 1 and 2), Business Roadmap, Functional Decomposition Diagram, and Gantt Chart. The Analysis-Design Phase incorporates Use Case Diagrams, Storyboards, Database Design using Entity-Relationship Diagrams and Data Dictionary, and Network Design, which includes Network Model and Network Topology. During the Development/Construction/Build Phase, the focus is on the Technology Stack, Software Specification, Hardware Specification, Program Specification, and a detailed List of Modules. Additionally, the chapter provides a comprehensive Testing Plan that encompasses Unit Testing, Integration Testing, Alpha Testing, and Acceptance Testing.

Research Design

The selected approach is a descriptive research design, which enables the observation, description, and documentation of the volunteer matching process in its natural state, without any interference or alteration (Shinija, 2024). The descriptive research design is ideal for this study because it offers a detailed overview of the current volunteer matching landscape in the city. This approach provides a clear insight into the specific challenges and needs of both volunteers and organizations. It involves carefully identifying and defining key variables, capturing them as they naturally occur in the real world. According to Enago (2023), Descriptive research design is a research methodology aimed at providing a detailed, accurate account of a phenomenon as it naturally occurs. This design focuses on observing, describing, and documenting specific characteristics or processes without manipulating the environment or influencing the subjects. It is used to gain a comprehensive understanding of the current state of affairs, ensuring that the audience is well-informed about the study's outcomes.

Method. This research will adopt a quantitative approach, analyzing numerical data gathered from observations to elucidate and describe the observed processes. This method emphasizes presenting factual statements that clarify the importance of the cases in straightforward terms, rather than exploring their necessity and integrates diverse methodologies (Taherdoost, 2022). By using this approach, the study aims to deliver clear and accurate insights based on measurable data, providing the audience with reassurance about the study's findings.

Flow of the Study. This diagram shows the different inputs, processes that these inputs will undergo to produce the needed information, and the output of the study.

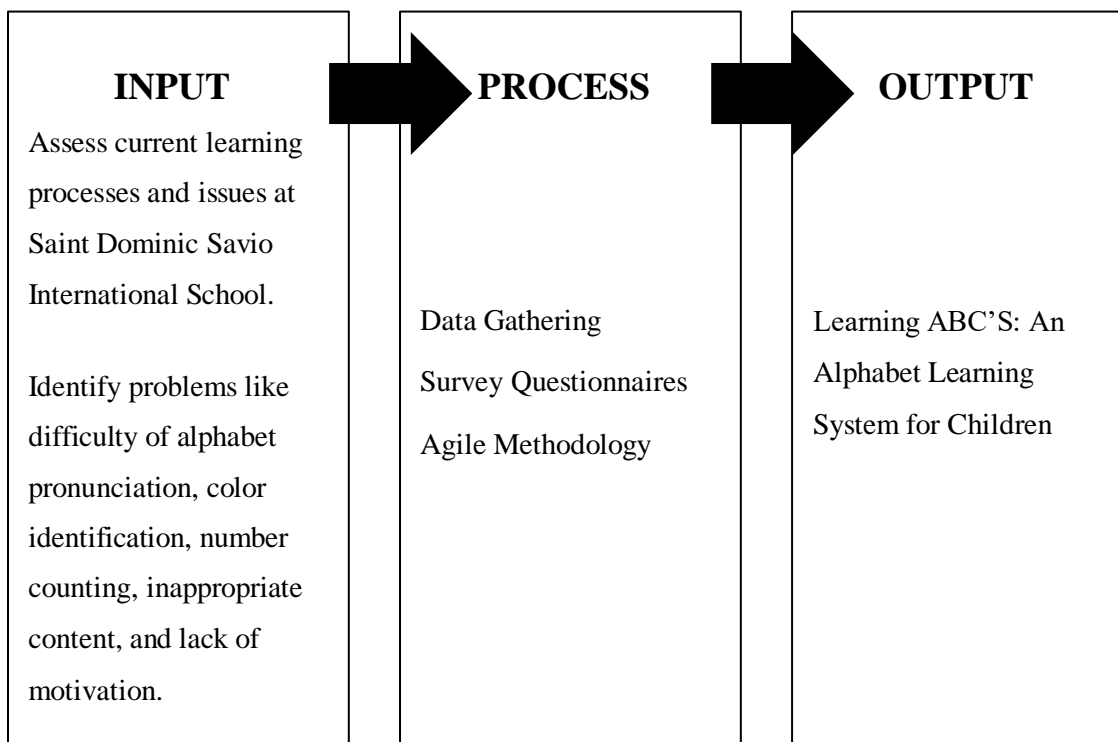


Figure 6: **Flowchart of LEARNING ABC'S**

Figure 6 outlines the workflow of the study. The initial step involves identifying the problem to underscore the significance of the proposed solution. During system development, features are designed to collect data from parent/guardian responses, which will be used to analyze and improve children's pronunciation of basic alphabet letters. The system and its features are developed based on the collected information. The study will be considered complete once the design and development phases are concluded.

Research Environment. The research is conducted at Saint Dominic Savio International School, located at 3120 Sangi New Road, Pajo, 6015 Lapu-Lapu City, Cebu. This site is chosen for its emphasis on early childhood education and the integration of cutting-edge technology. Renowned for its commitment to holistic development, the school provides a robust curriculum tailored for nursery students. The selected app for this study is designed for young children and includes interactive activities that foster cognitive and social development. The surrounding area, which features community parks and libraries, further enhances the learning environment. This setting is intended to evaluate the impact of educational technology on early childhood education by utilizing both the school's resources and the local community to support thorough educational research.

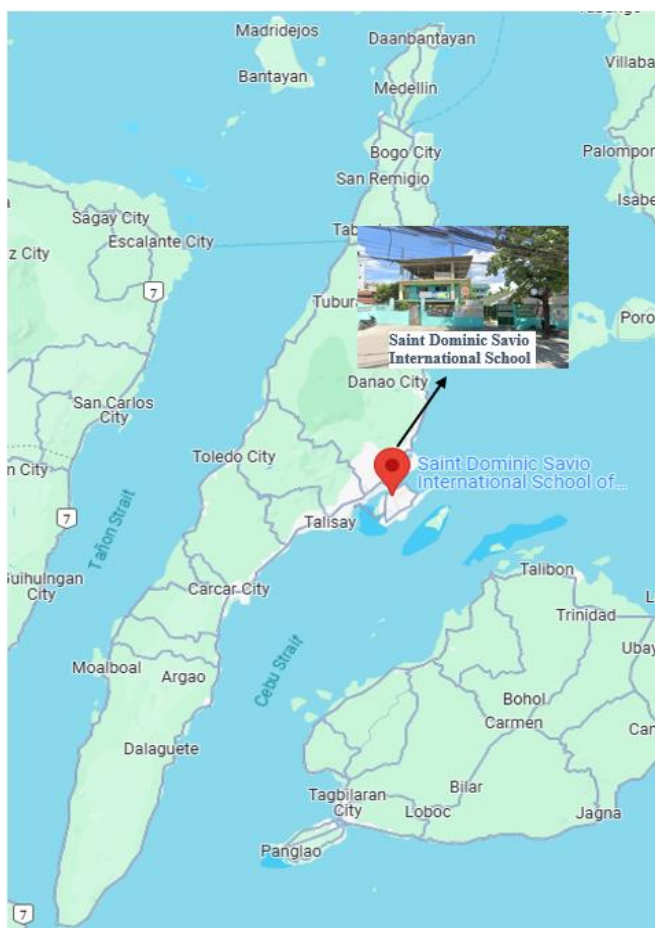


Figure 7: **Map of Research Environment**

Research Respondents. The research for Learning ABCs was a collaborative effort involving 200 teachers and parents from the Saint Dominic Savio International School community. Their valuable insights, collected using a convenience sampling method, have been instrumental in ensuring the reliability of the Alphabet Learning System for children.

Research Instruments

The researchers conducted an extensive survey using a 5-point Likert scale model. The survey gathered information on respondents' demographics, needs and trends, potential features of the system, barriers, and challenges and included a section for recommendations and suggestions from the respondents.

Research Procedures. The researchers conducted this study with utmost care and thoroughness. They administered surveys within Saint Dominic Savio International School, ensuring all participants were fully informed of their right to decline participation. The comprehensive survey, using the procedural framework of the 5-point Likert scale model, was employed during the investigation, further enhancing the reliability of the findings.

Software Engineering Methodology

Agile software development emphasizes flexibility to boost productivity and team communication. It values straightforward interactions and minimal documentation over complex processes, aiming for a user-friendly approach. By adopting Agile methodologies, the development process becomes more functional and transparent, facilitating software creation that aligns with client needs and reducing the risk of project failure through continuous testing.

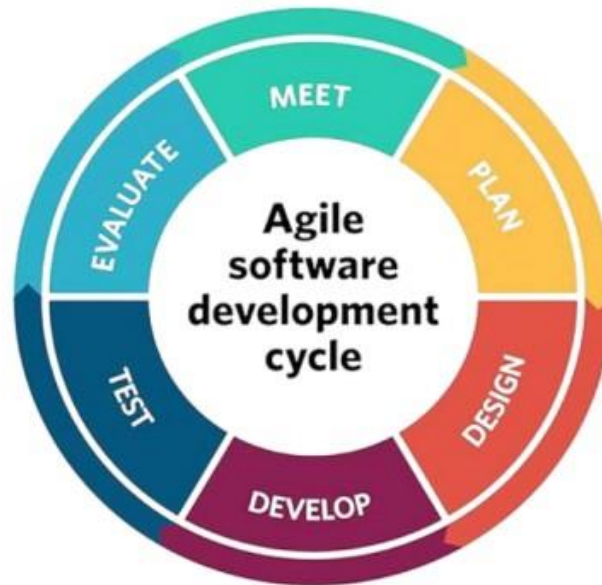


Figure 8: **Agile Software Development Cycle**

The Agile Software Development Cycle, depicted in the diagram above, is a collaborative process that will guide the system development for this project. It includes phases such as meeting, planning, designing, developing, testing, and evaluating. This methodology enhances efficiency by maintaining a steady workflow and rotating backend tasks, which allows for quick adjustments as necessary. Agile's focus on feedback and iterative testing makes it particularly suited for this project, given its success with startups and its alignment with the tight timelines of academic research.

Meeting Phase. During this phase, the researchers will determine the system's design requirements. They will gather information from the Saint Dominic Learning Center to understand the teachers' needs and refine the system accordingly. A brief survey will be conducted among teachers to collect basic information and identify areas for improvement in the proposed system.

Planning Phase. The team will identify challenges and conceptualize ideal solutions using tools like the Business Model Canvas, Validation Board, and Gantt Chart. A detailed project timeline will be established, and comprehensive planning will be conducted to ensure a solid foundation for system development.

Designing Phase. The system's functionalities will be detailed and visualized in this phase. The user interface and wireframe designs will be created using tools like Use Case Diagrams, Database Design, Network Design, and Figma to represent the system.

Development Phase. This phase involves integrating all previous work into the development process. Backend development will use Visual Studio 2022 for framework integration, Microsoft SQL for database management, and GitHub for project flexibility. Adherence to the plans and guidelines from earlier phases is crucial for successful system implementation.

Testing Phase. The system will undergo rigorous evaluation to ensure proper functionality. Stress and network testing will identify and resolve errors, improving the system's reliability and performance.

Evaluation Phase. In the final phase, The researchers will conduct a thorough review to confirm that the system meets all requirements and is ready for deployment. The researchers assess all testing outcomes and improvements to ensure system readiness, providing a high level of confidence in the system's performance.

Planning/Conception-Initiation Phase

The Initiation Phase marks the beginning of the project, where the core idea is explored and elaborated to understand how mobile devices can enhance teacher-student interactions. Following this, the Planning Phase is critical in the Software Development Life Cycle (SDLC) as it involves defining the project's scope and creating a detailed action plan. This phase includes modeling essential deliverables such as the Business Model Canvas, Program Workflow, Validation Board, Business Roadmap, Gantt Chart, and Functional Decomposition Diagram. The information and plans developed during this phase are instrumental in shaping the project/system to achieve the study's objectives, underscoring the significance of each team member's role.

Business Model Canvas. A business model diagram visually represents a company's core strategy for creating, delivering, and capturing value. A widely used framework for this purpose is the Business Model Canvas, developed by Alexander Osterwalder and Yves Pigneur. This tool helps businesses map out their key components, including value propositions, customer segments, revenue streams, and more, to communicate and refine their business strategy.

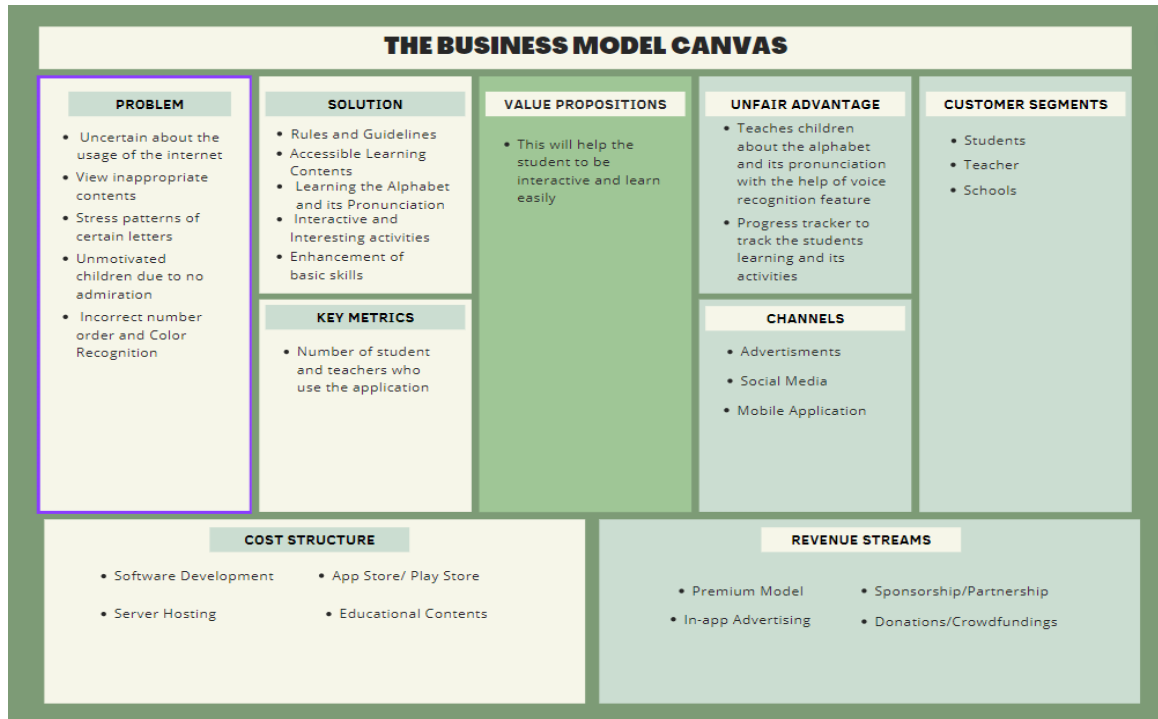


Figure 9: **Business Model Diagram**

The figure above is the Business Model Canvas of Learning ABCs, a key project component. This mobile learning platform for children is designed to provide a space where they can learn, practice, and emphasize their pronunciation skills under the guidance of their teachers. The following details provide a comprehensive overview of this application.

Program Workflow. A program workflow details the organized sequence of steps and activities necessary to complete a project successfully. It generally includes setting objectives, conducting research, planning, executing tasks, monitoring progress, and finalizing deliverables. This workflow fosters a thorough and cohesive outcome by systematically addressing and integrating all components.

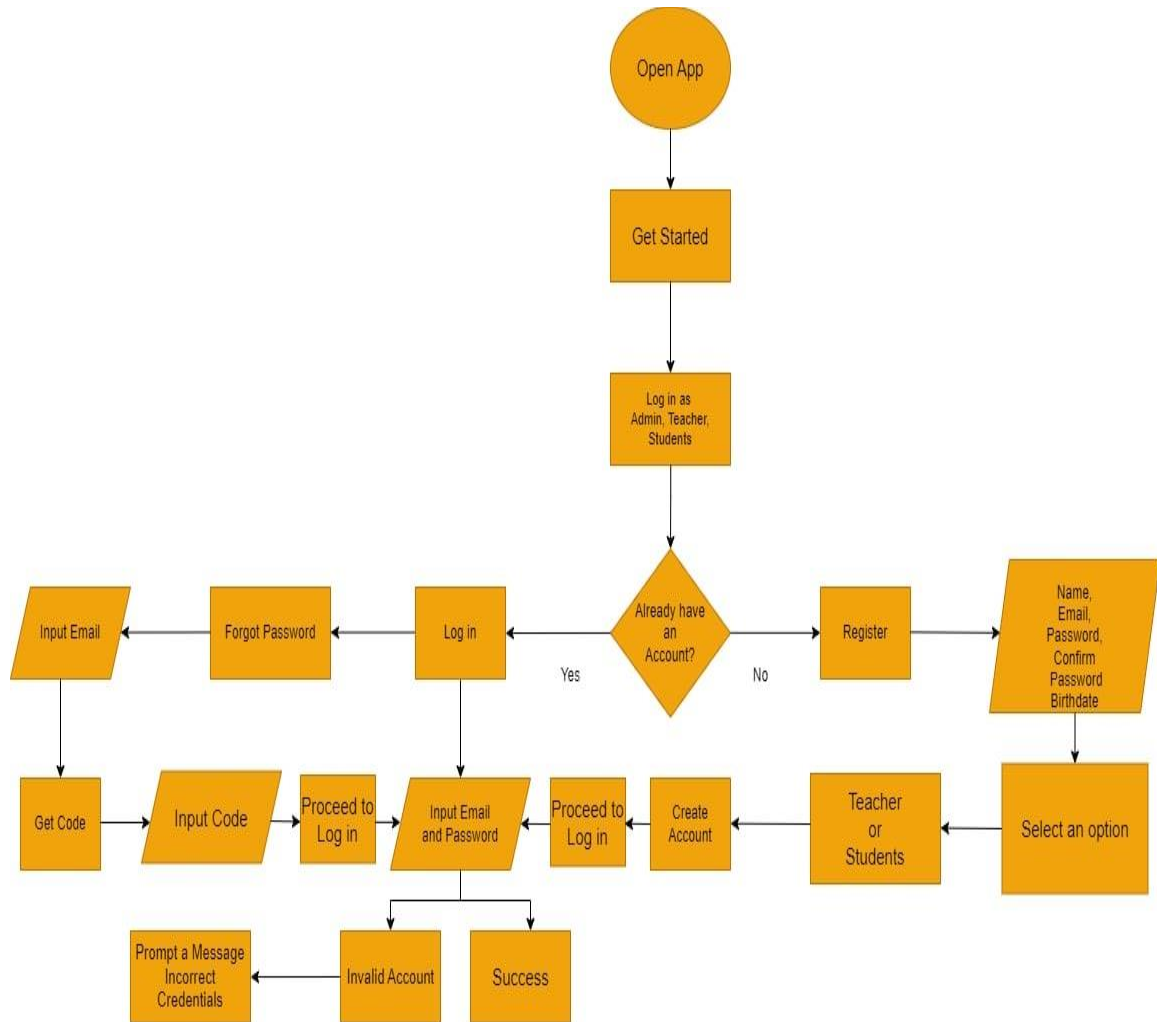


Figure 10: **Program Workflow - Login/Register**

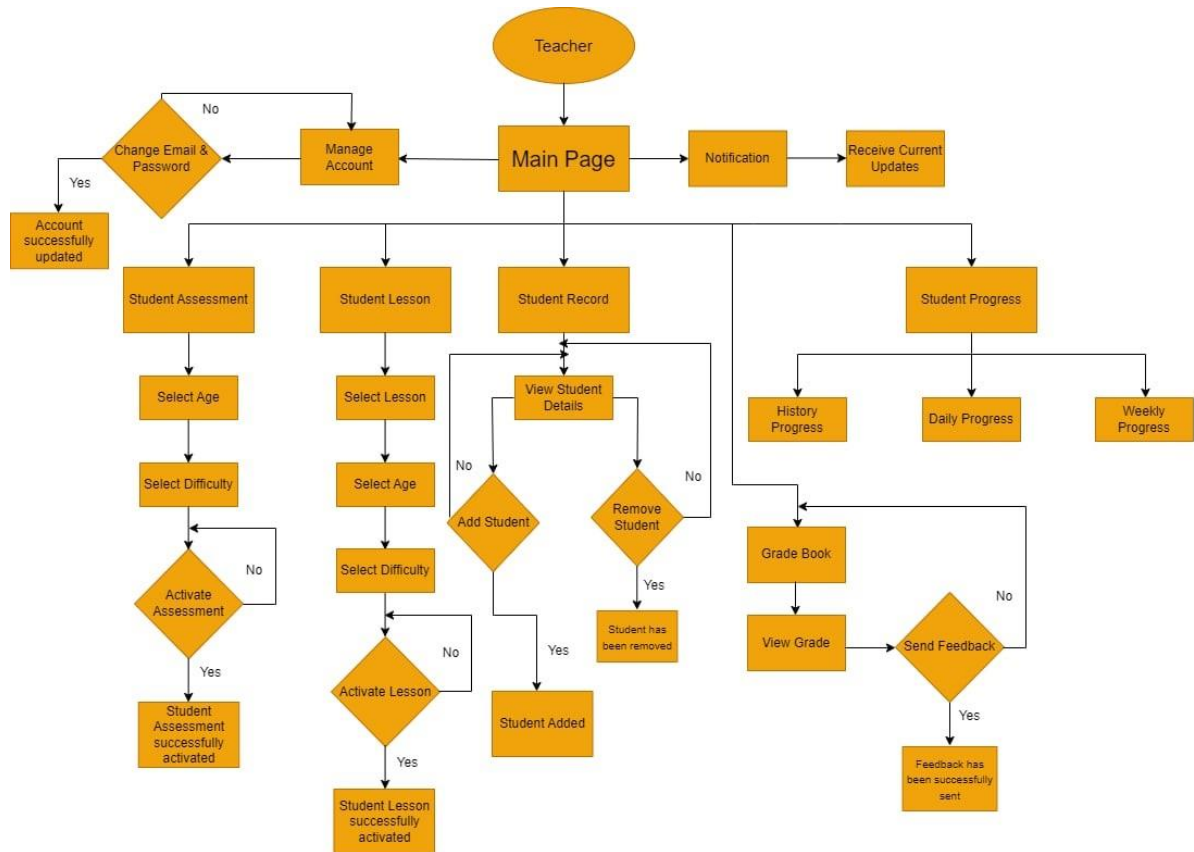


Figure 11: **Program Workflow - Teacher Side**

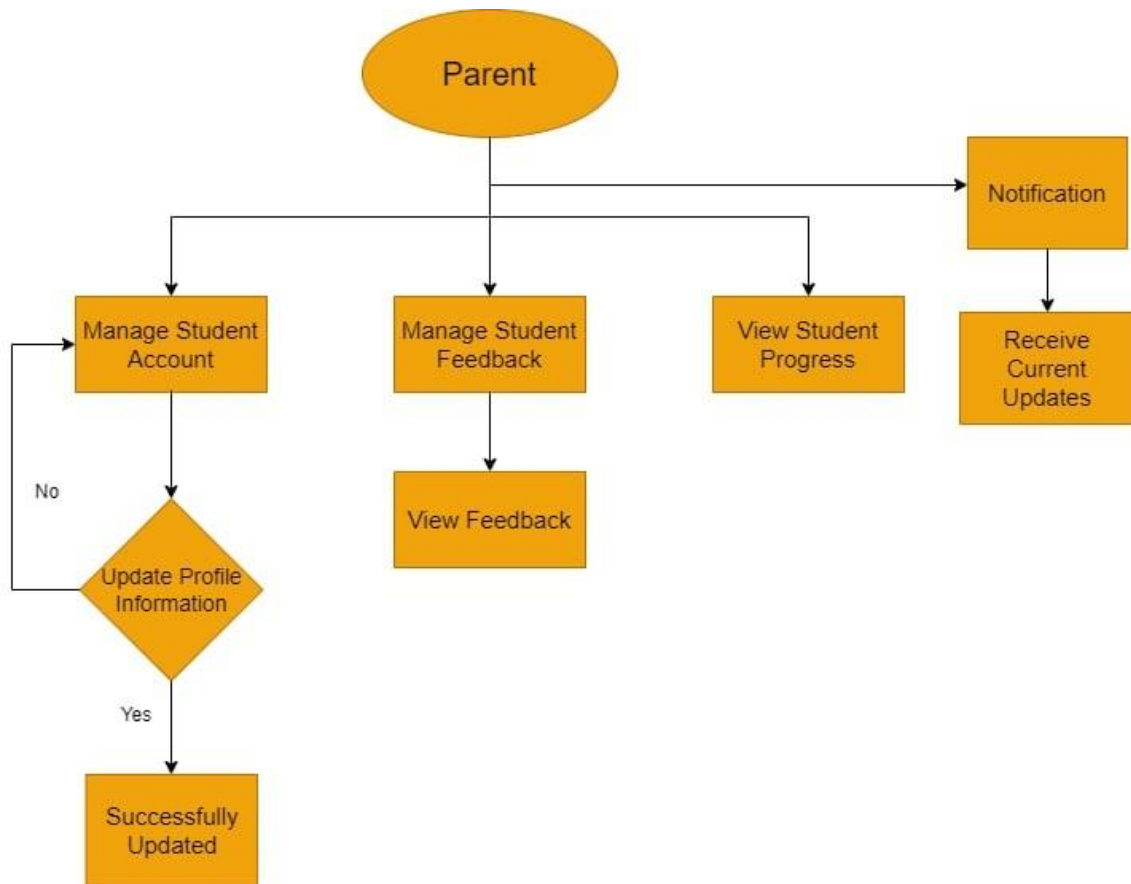


Figure 12: **Program Workflow - Parent Side**

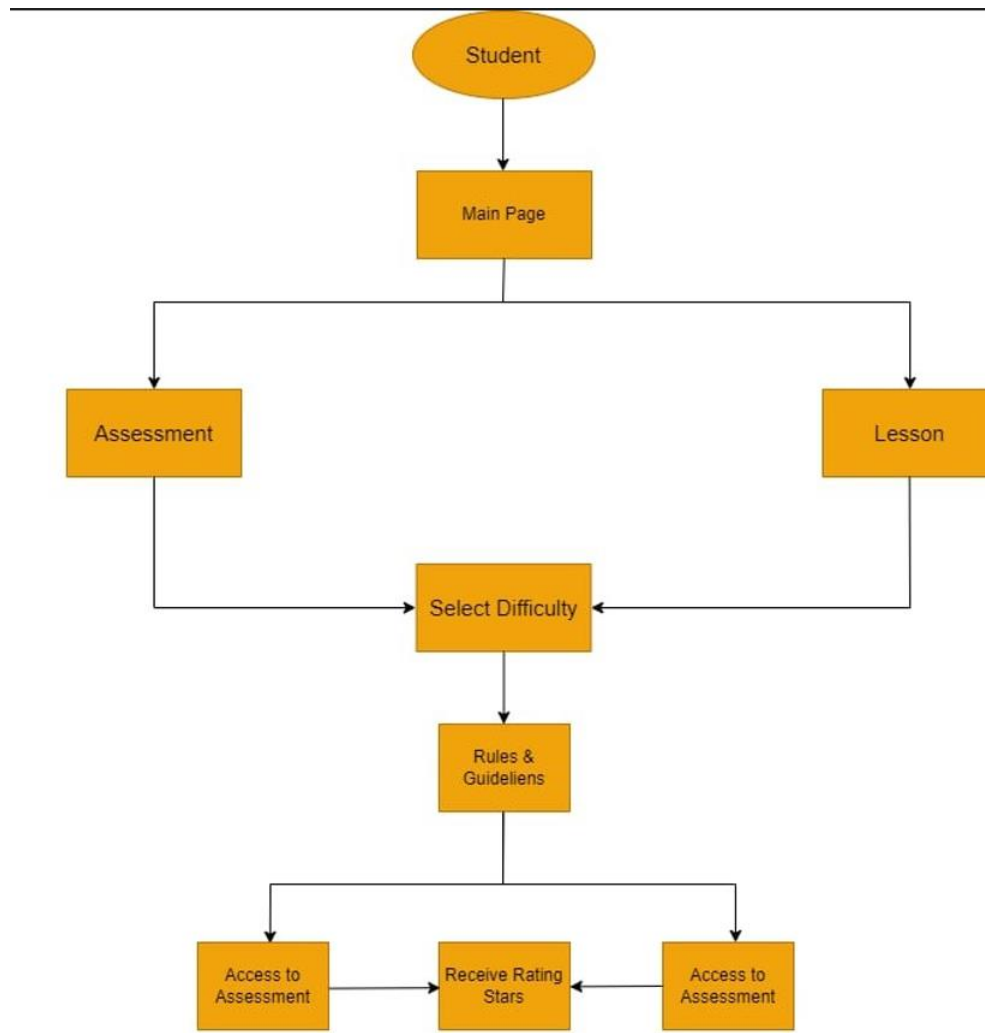


Figure 13: **Program Workflow - Student Side**

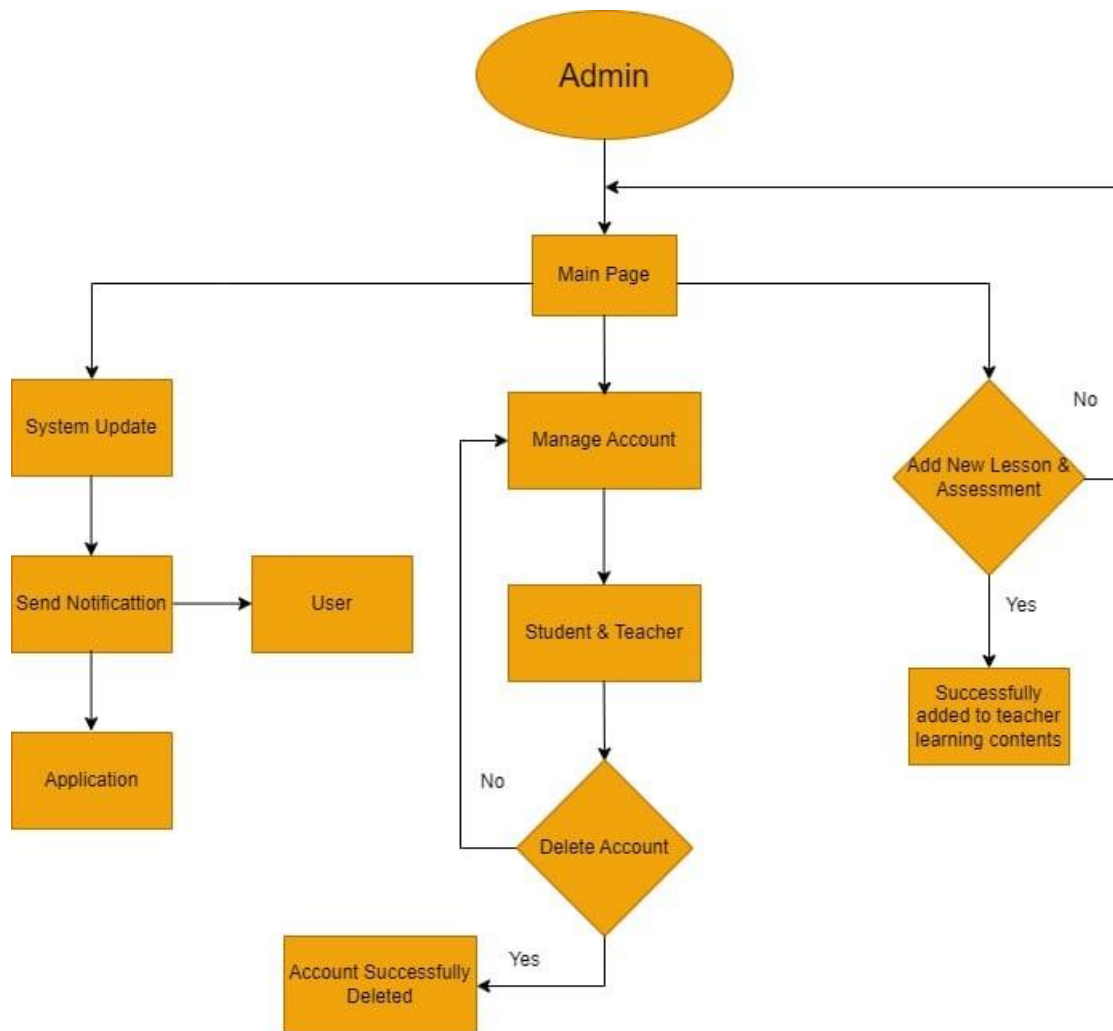


Figure 14: **Program Workflow - Admin Side**

Validation Board. A validation board is a tool used to test startup ideas efficiently without significant time or financial investment. It features several key sections, including Customer Hypothesis, Problem Analysis, and Solution Analysis. These sections can be updated as new hypotheses are gathered, allowing for iterative adjustments based on ongoing insights and feedback.

Validation Board

Project Name: Learning ABC's

Team Leader Name:

| Track Pivots | 1st Pivot | 2nd Pivot | 3rd Pivot | 4th Pivot |
|---|--|-----------|-----------|-----------|
| Customer Hypothesis TEACHER | CHILD | | | |
| Problem Hypothesis In this emerging technological advancements children might find classic teaching boring. | Children don't know how to use the internet safely and can access things that might harm them. | | | |
| Solution Hypothesis Creating a mobile application that can maximize their learning and new teaching styles. | Accessible and ready-made learning contents and exercises. | | | |

| Design Experiment | Riskiest Assumption | Results |
|--|---|--|
| <p>Technology as a new learning instrument</p> <p>Core Assumptions Assumptions that must be validated for the business to work</p> <p>Unsafe contents</p> | <p>Unsafe contents</p> <p>Voice Recognition</p> <p>Number</p> | <p>Invalidated</p> <p>Unsafe contents</p> <p>Validated</p> <p>Ready-made learning contents</p> <p>Progress Tracker of the student</p> <p>Lesson Creation</p> |

www.ValidationBoard.com

Figure 15: Validation Board of Learning ABC's

Startup Idea: Learning ABC's: A Mobile Learning App for Children

The figure above illustrates the pivots related to the Customer, Problem, and Solution Hypotheses for Learning ABCs. It also highlights the design experiment, the highest risk, and the methods and criteria for evaluating the system. Additionally, the proponents have addressed potential concerns related to the system's development and implementation.

Business Roadmap. A business roadmap is a strategic plan outlining a company's long-term objectives and the steps required. It provides a clear path for aligning goals, guiding decision-making, and coordinating efforts across the organization.

| <div> <div>Business Roadmap</div> <div>Learning ABC's: An Alphabet Learning System for Children.</div> </div> | | | | | |
|---|--|---|--|---|--|
| | 2024 PLANNING AND INITIAL DEVELOPMENT | 2025 FULL DEVELOPMENT AND FEATURE ENHANCEMENT | 2026 SCALING AND IMPROVEMENT | 2027 EXPANSION AND DIVERSIFICATION | 2028 INNOVATION AND LONG-TERM SUSTAINABILITY |
| OBJECTIVES | <ul style="list-style-type: none"> Establish the platform's foundation with planning and initial development. | <ul style="list-style-type: none"> Finalize platform features and launch it school-wide. | <ul style="list-style-type: none"> Enhance platform features and user experience. | <ul style="list-style-type: none"> Expand the platform's reach and diversify content. | <ul style="list-style-type: none"> Innovate and ensure the platform's long-term success. |
| OUTPUT | <ul style="list-style-type: none"> Conduct research, design the interface, set up infrastructure, and launch a beta version for feedback. | <ul style="list-style-type: none"> Finalize features, train teachers, launch the platform, and optimize based on feedback. | <ul style="list-style-type: none"> Add advanced features, improve app performance, and ensure security. | <ul style="list-style-type: none"> Extend to other schools, form partnerships, and add new subjects. | <ul style="list-style-type: none"> Integrate new technologies, plan international expansion, and develop sustainability strategies. |

Figure 16: **Business Roadmap of Learning ABC's**

The business roadmap for "Learning ABCs: An Alphabet Learning System for Children" outlines the project's trajectory from 2024 to 2028. In 2024, the focus is on planning and initial development, including research, interface design, infrastructure setup, and a beta launch to gather feedback. By 2025, the project aims to finalize features, implement the platform across schools, and provide teacher training and optimization. In 2026, the emphasis shifts to enhancing features, improving performance, and ensuring security. The 2027 phase targets expanding the platform's reach by partnering with additional schools and diversifying content with new subjects. Finally, in 2028, we'll be focusing on innovation and long-term sustainability. This is not just a project, it's a commitment to the future. We'll be achieving this through technology integration, international expansion, and the development of sustainability strategies.

Functional Decomposition Diagram. A functional diagram visually maps out the various functions and processes within the system under development or analysis. It illustrates the interactions and integrations among system components to achieve the intended goals. This diagram is essential for grasping the system's workflow, spotting potential issues, and confirming that all elements are aligned with the project's objectives.

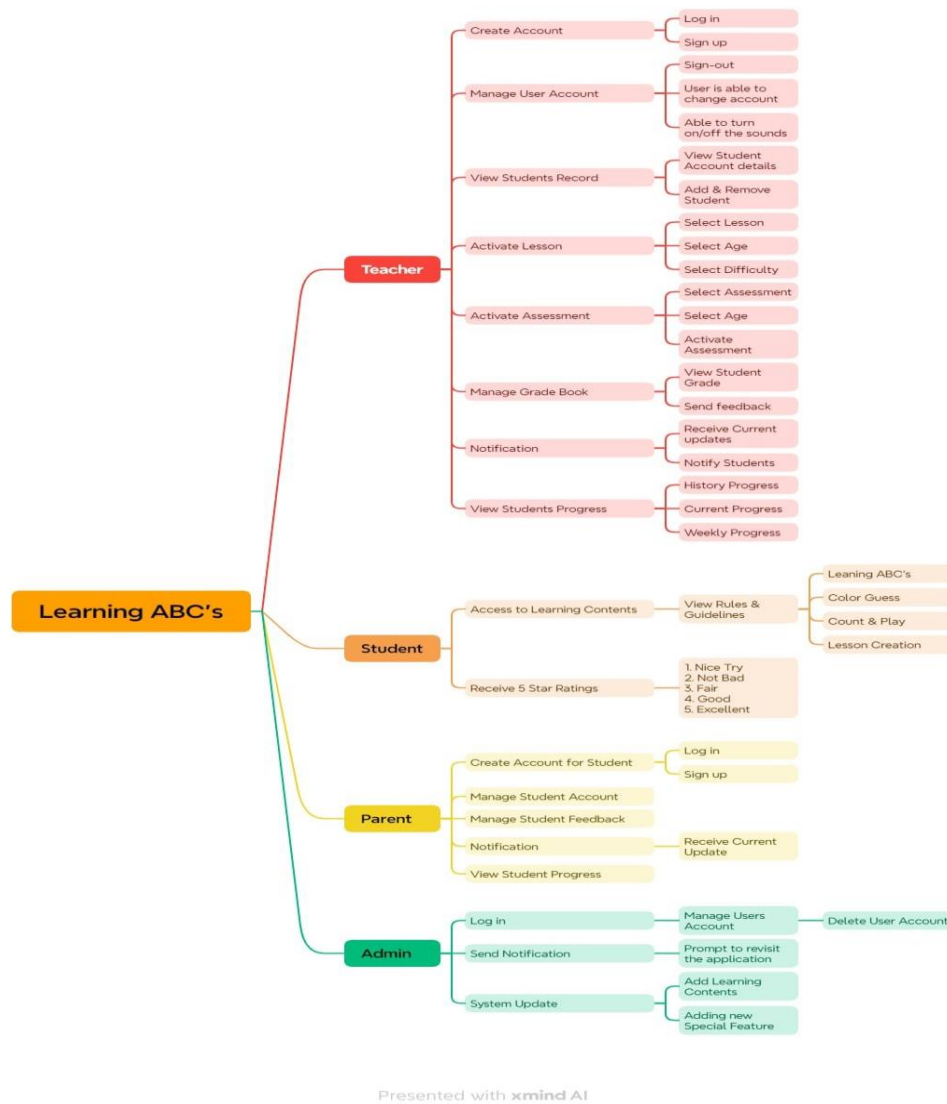


Figure 17: **Functional Decomposition Diagram of Learning ABC's**

The learning ABCs Functional Decomposition Diagram is shown in the image above. A student's mobile learning platform displays the diagram that hierarchically breaks down a system or process into its components of sub-processes.

Gantt Chart. A Gantt chart is a powerful project management tool used to visualize the timeline and progress of a project. It helps in planning, coordinating, and tracking specific tasks and milestones within a project. In a capstone project, a Gantt chart can ensure that all project phases are completed on time and in the correct sequence.

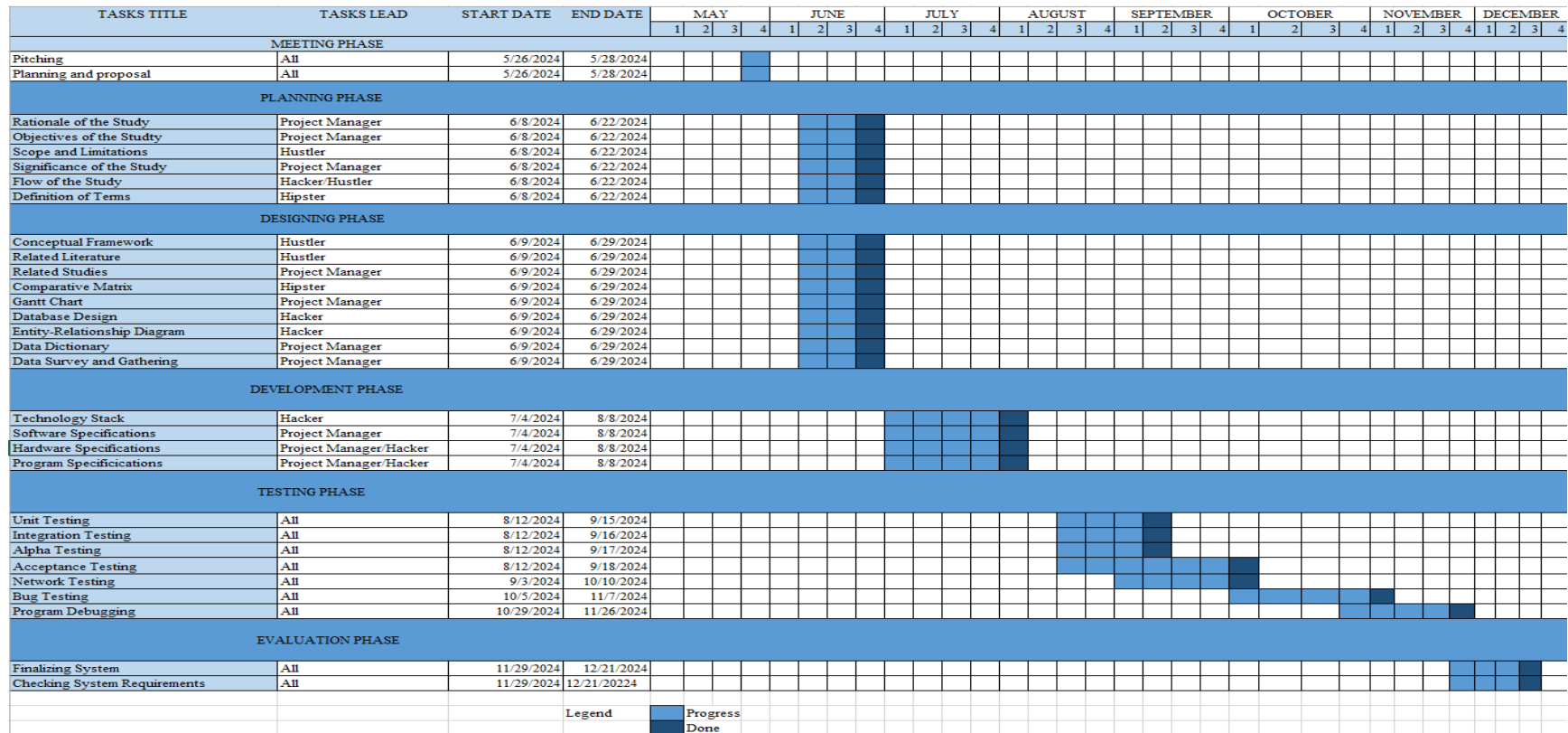


Figure 18: **Gantt Chart of LEARNING ABC'S**

The Learning ABCs Gantt Chart is shown in the image above where specific tasks are given to different assignees and dates are shown from when it is started and when it is ended.

Analysis-Design Phase

The analysis and design phase is a critical step in the software development process, aiming to identify and formalize the application's requirements. To achieve this, researchers employ a range of tools such as Use Case Diagrams, Functional Decomposition Diagrams, Storyboards, Database Design, and Entity Relationship Diagrams.

Use Case Diagram. A use case diagram visually represents the interactions between users (actors) and a system, outlining the system's functional requirements. It details what the system does and how users engage with it. Integral to the Unified Modeling Language (UML), use case diagrams are essential in system analysis and design, particularly within software engineering.

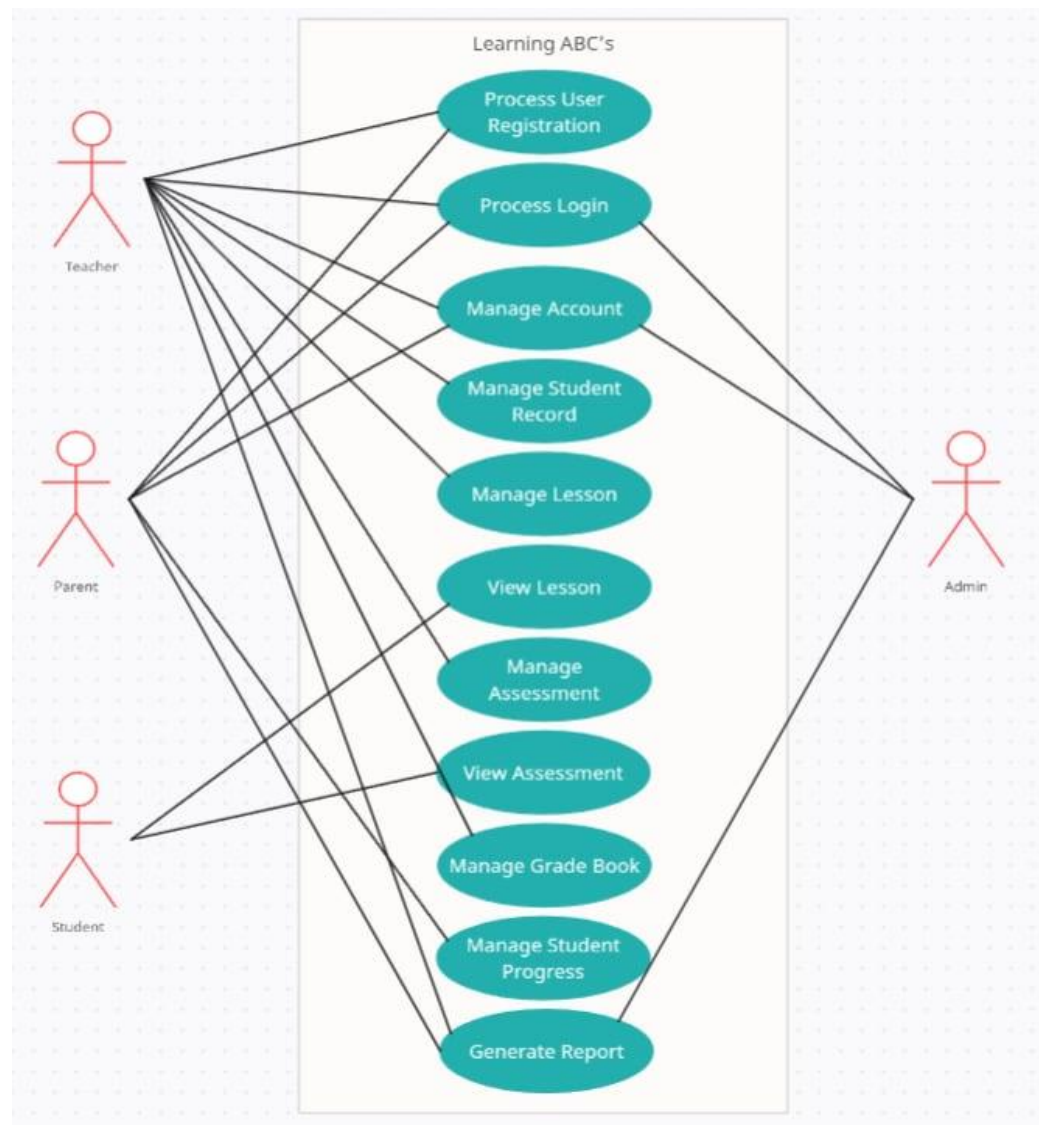


Figure 19: System Use Case Model-Learning ABC's

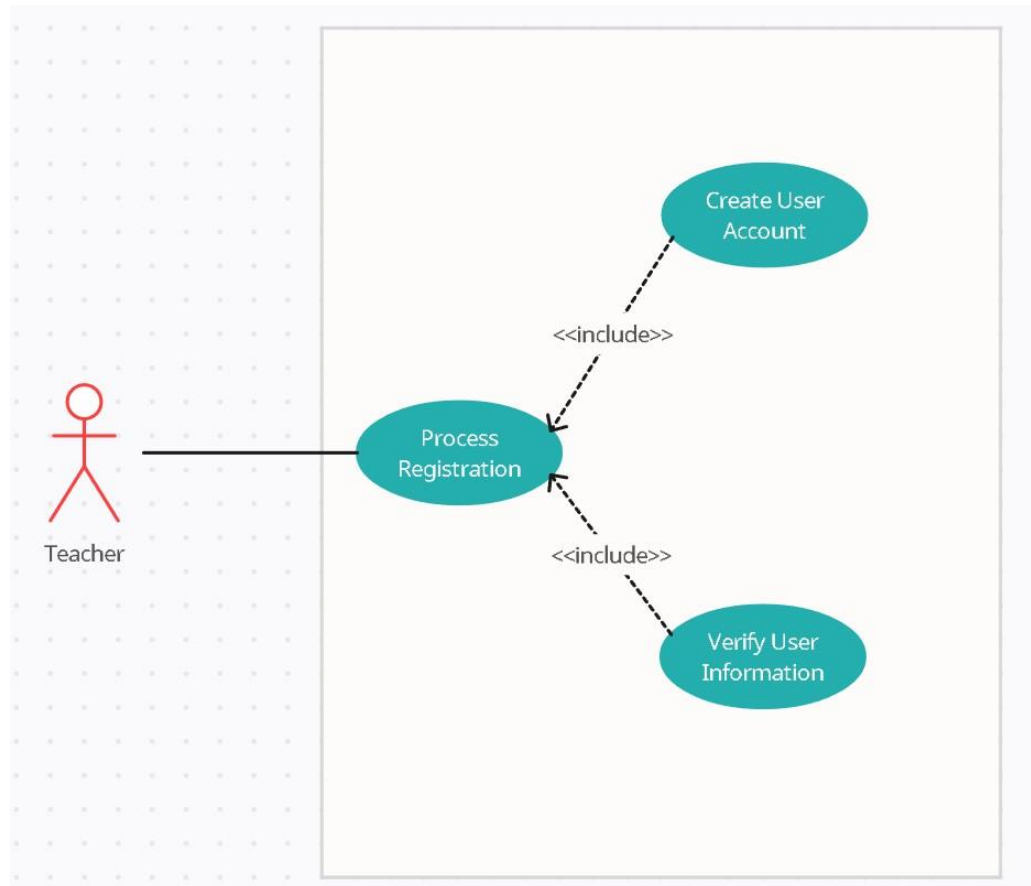


Figure 20: **System Use Case Model – PROCESS REGISTRATION**

| Use Case Name | Teacher Process Registration | |
|--------------------------|--|---|
| Purpose | Teacher are able to proceed with the login process. | |
| Triggering Actor | Teacher | |
| Brief Description | This allows the teacher to create an account and log in. | |
| Pre-Condition | The teacher fills out the form to create an account. | |
| Post-Condition | The teacher has successfully created an account and can proceed to log in. | |
| Flow of Activity | TEACHER | SYSTEM |
| | 1. The teacher fills out all the information on the form. | 1.1 It will successfully create an account. |

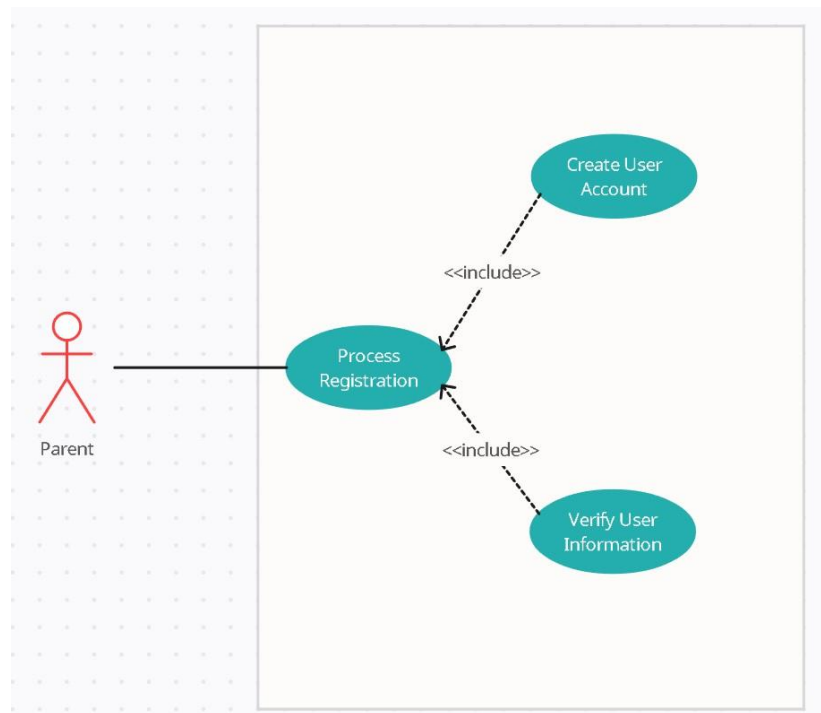


Figure 21: **System Use Case Model – PROCESS REGISTRATION**

| Use Case Name | Parent Process Registration | |
|--------------------------|---|---|
| Purpose | Parent are able to proceed with the login process. | |
| Triggering Actor | Parent | |
| Brief Description | This allows the parent to create an account for the student and log in. | |
| Pre-Condition | The parent fills out the form to create an account. | |
| Post-Condition | The parent has successfully created an account and can proceed to log in. | |
| Flow of Activity | PARENT | SYSTEM |
| | 1. The parent fills out all the information on the form. | 1.1 It will successfully create an account. |

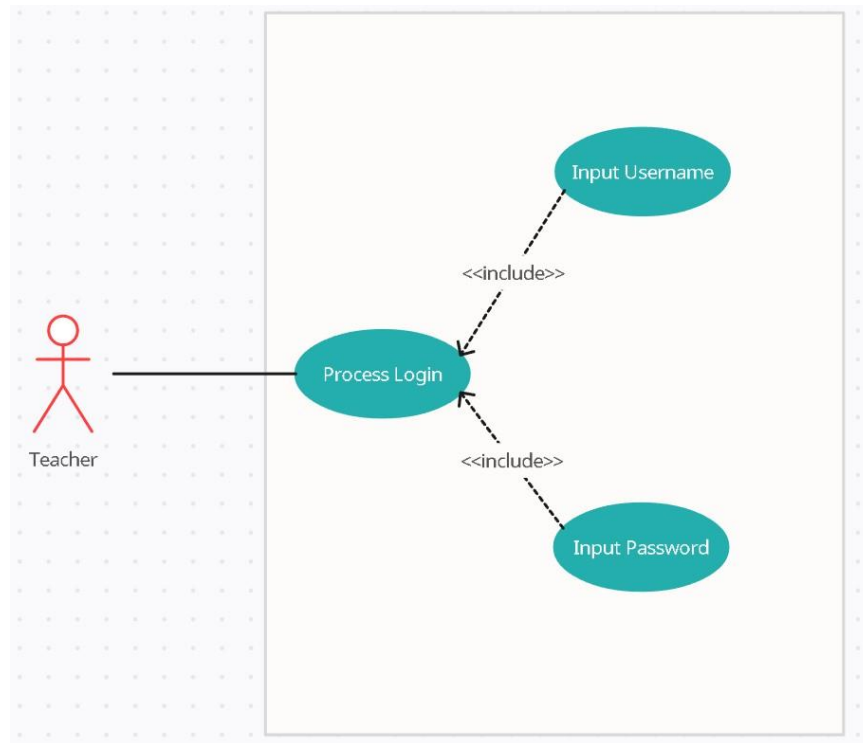


Figure 22: **System Use Case Model – PROCESS LOGIN**

| Use Case Name | Teacher Process Login | |
|--------------------------|--|--|
| Purpose | The teacher can proceed to the main page. | |
| Triggering Actor | Teacher | |
| Brief Description | The teacher can proceed to the main page after entering the username and password. | |
| Pre-Condition | Teachers must input their registered account details. | |
| Post-Condition | It will successfully login | |
| Flow of Activity | TEACHER | SYSTEM |
| | 1. Enter the username and password | 1.1 It will successfully log in and proceed to the main page |

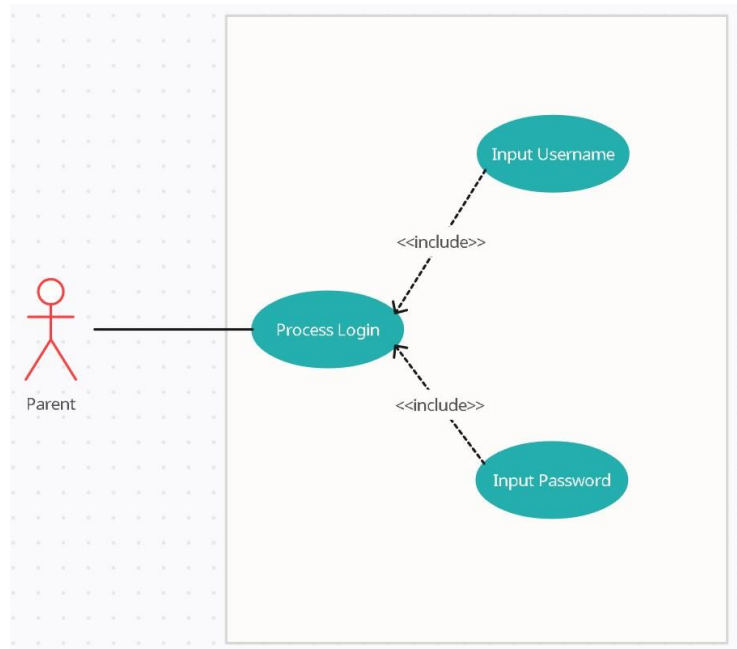


Figure 23: **System Use Case Model – PROCESS LOGIN**

| Use Case Name | Parent Process Login | |
|--------------------------|--|--|
| Purpose | Parent can proceed to the main page. | |
| Triggering Actor | Parent | |
| Brief Description | The parent guides the student in logging into their account. | |
| Pre-Condition | Parent must input their registered account details. | |
| Post-Condition | It will successfully login | |
| Flow of Activity | PARENT | SYSTEM |
| | 1. Enter the username and password | 1.1 It will successfully log in and proceed to the main page |

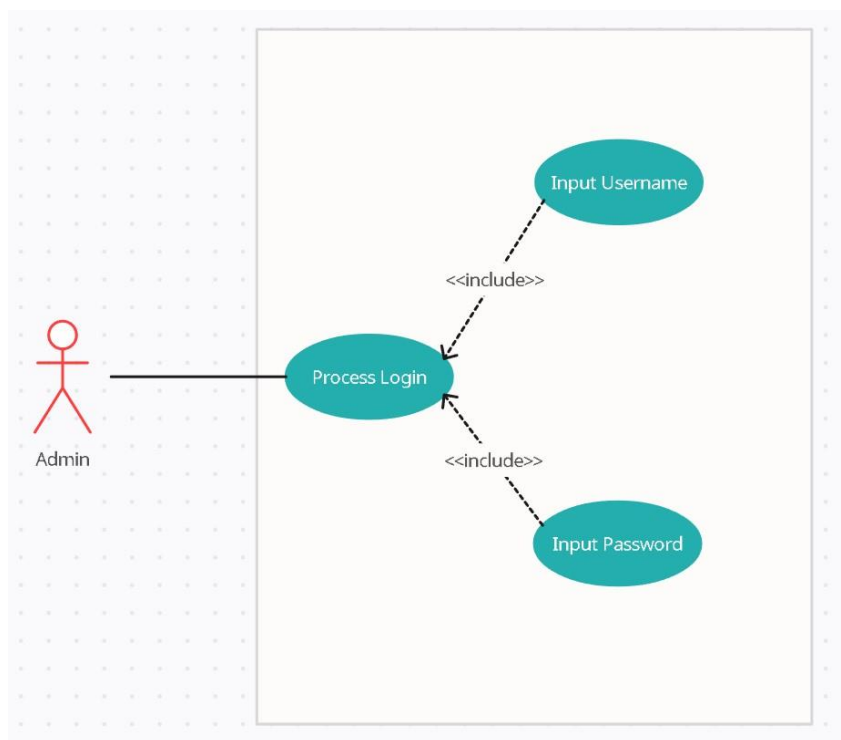


Figure 24: **System Use Case Model – PROCESS LOGIN**

| Use Case Name | Admin Process Login | |
|-------------------|--|--|
| Purpose | Admin can proceed to the main page. | |
| Triggering Actor | Admin | |
| Brief Description | The teacher can proceed to the main page after entering the username and password. | |
| Pre-Condition | Admin must input their registered account details. | |
| Post-Condition | It will successfully login | |
| Flow of Activity | ADMIN | SYSTEM |
| | 1. Enter the username and password | 1.1 It will successfully log in and proceed to the main page |

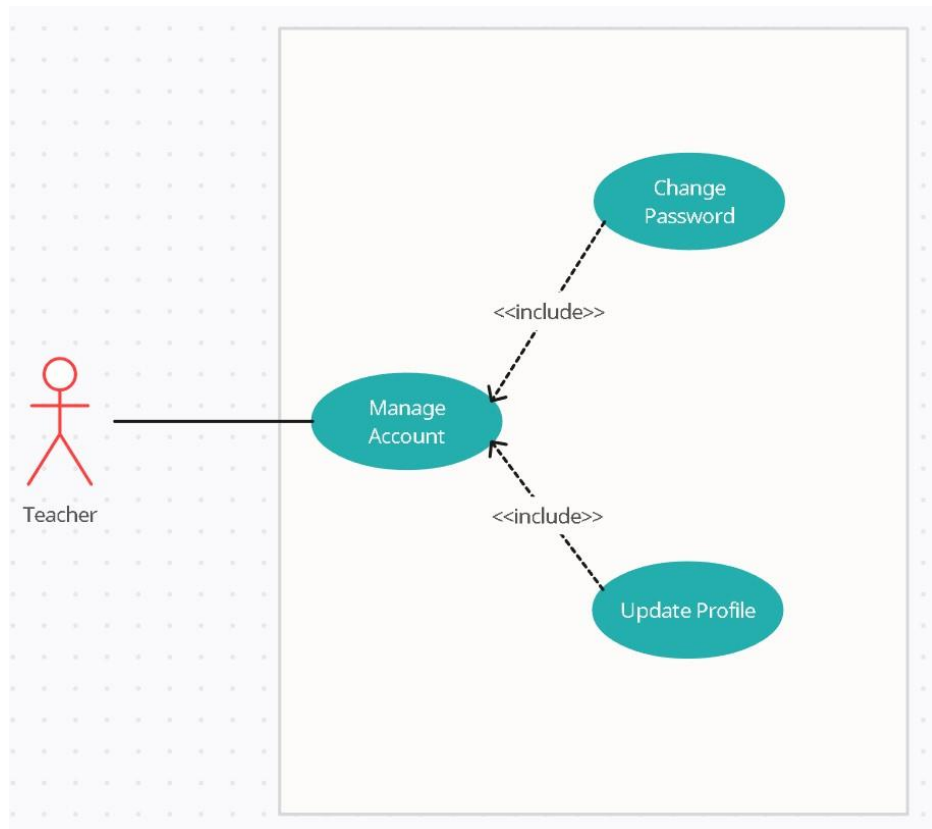


Figure 25: **System Use Case Model – MANAGE ACCOUNT**

| Use Case Name | Teacher Manage Account | |
|--------------------------|---|--|
| Purpose | Teachers can view and update their profile. | |
| Triggering Actor | Teacher | |
| Brief Description | The teacher can manage their account by updating their profile and viewing account details. | |
| Pre-Condition | Updating the profile by changing the email and password. | |
| Post-Condition | It will successfully update the profile | |
| Flow of Activity | TEACHER | SYSTEM |
| | 1. View account details and update the profile | 1.1 The system will display the account details and successfully update the profile if changes are made. |

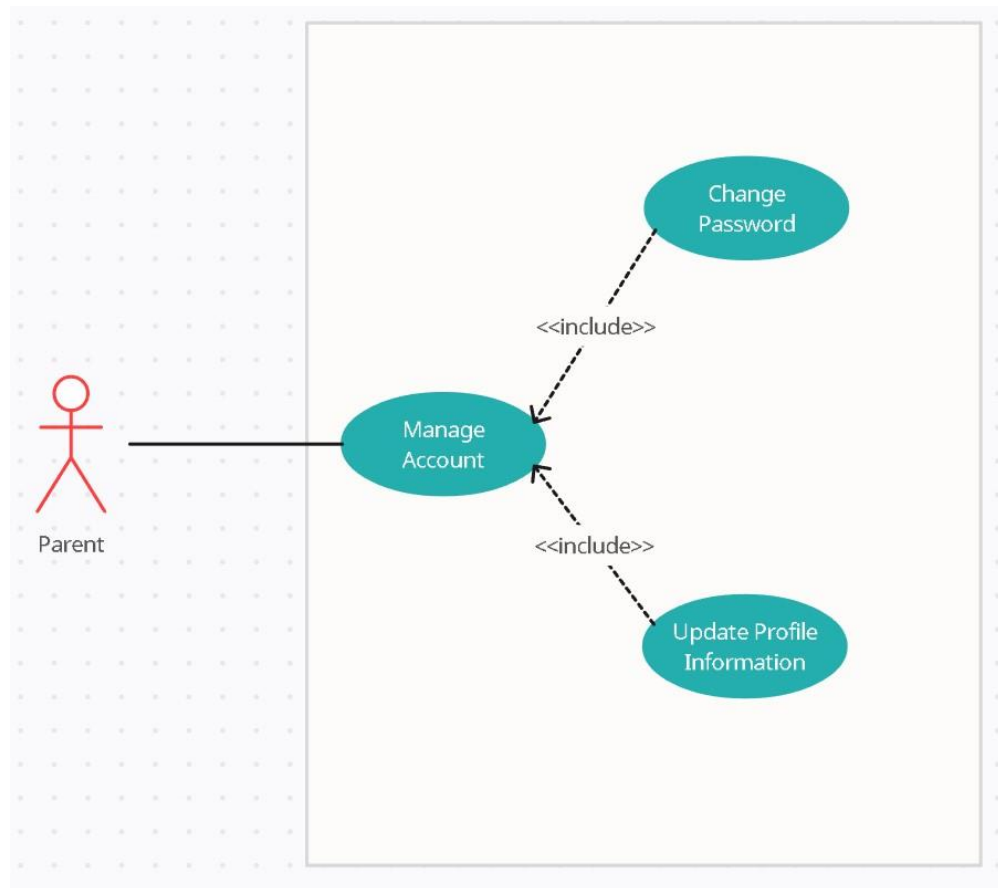


Figure 26: **System Use Case Model – MANAGE ACCOUNT**

| Use Case Name | Parent Manage Account | |
|-------------------|--|--|
| Purpose | Parent can view and update the student profile. | |
| Triggering Actor | Parent | |
| Brief Description | The parent can manage the student account by updating their profile and viewing account details. | |
| Pre-Condition | Updating the profile by changing the email and password. | |
| Post-Condition | It will successfully update the profile | |
| Flow of Activity | PARENT | SYSTEM |
| | 1. View account details and update the profile | 1.1 The system will display the account details and successfully update the profile if changes are made. |

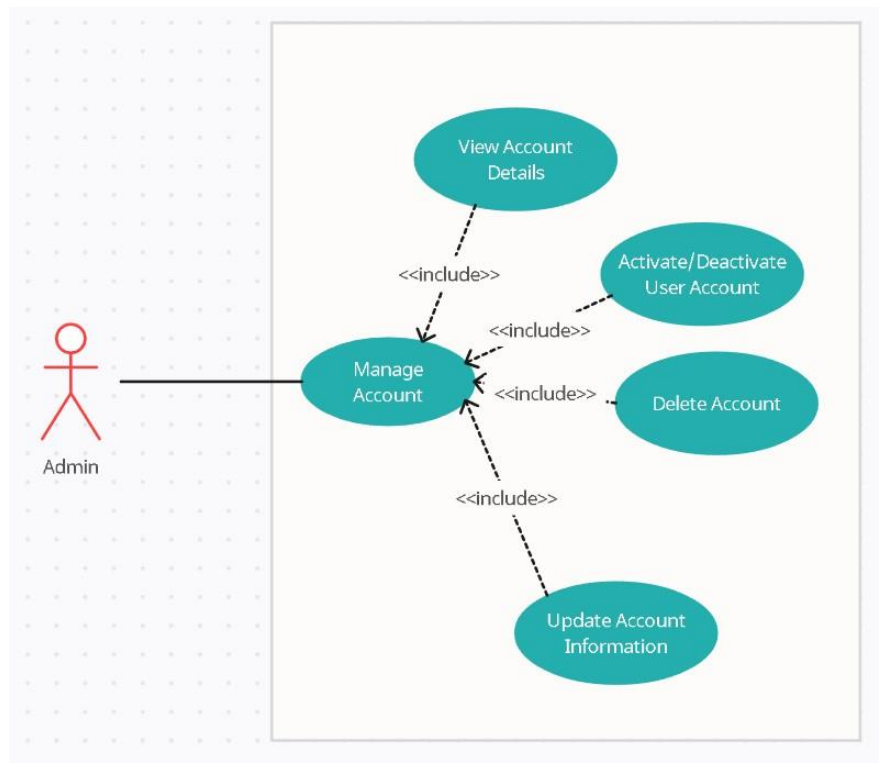


Figure 27: **System Use Case Model – MANAGE ACCOUNT**

| Use Case Name | Admin Manage Account | |
|-------------------|--|---|
| Purpose | To manage both student and teacher accounts | |
| Triggering Actor | Admin | |
| Brief Description | The admin can manage both student and teacher accounts and is also authorized to delete user accounts. | |
| Pre-Condition | Manage all accounts, including deleting user accounts. | |
| Post-Condition | It will successfully update the profile | |
| Flow of Activity | ADMIN | SYSTEM |
| | 1. Manage both student and teacher accounts, including deleting accounts. | 1.1 The system will successfully update their profile |

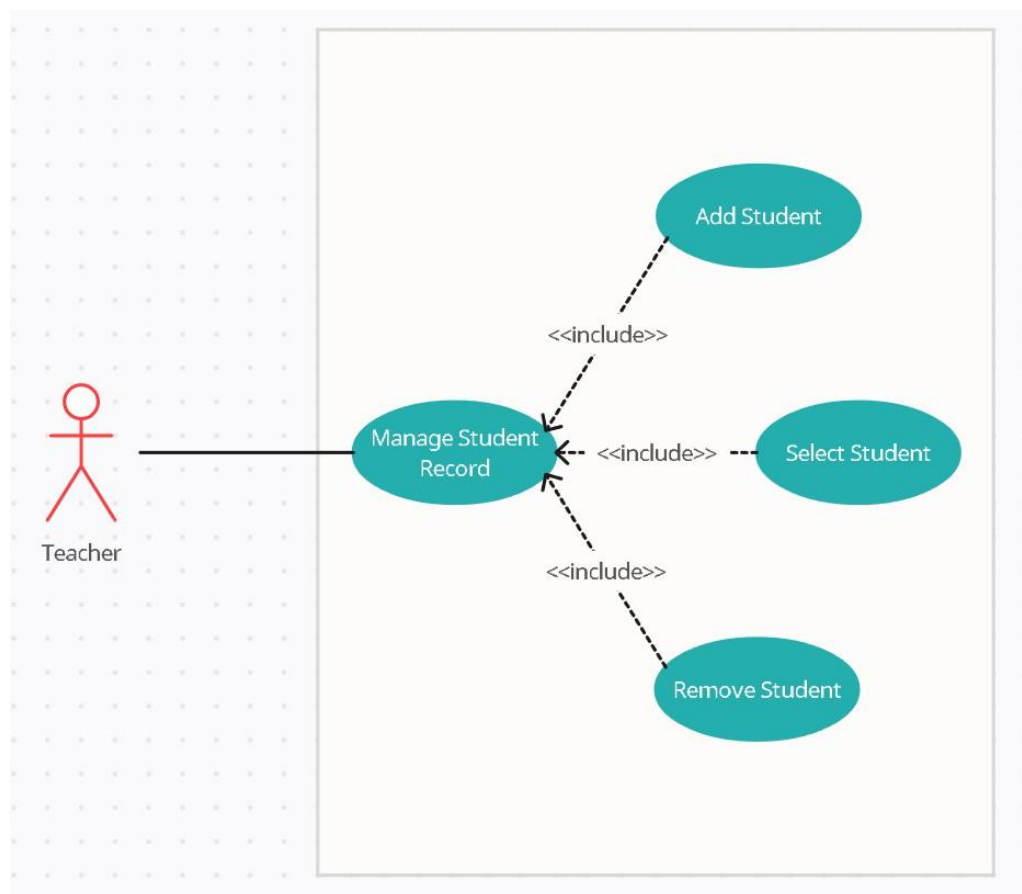


Figure 28: **System Use Case Model – MANAGE STUDENT RECORD**

| Use Case Name | Manage Student Record | |
|-------------------|--|---|
| Purpose | To manage student record | |
| Triggering Actor | Teacher | |
| Brief Description | Teachers can view student details and also add or remove students. | |
| Pre-Condition | Manage student records by adding or removing them. | |
| Post-Condition | The student record has been successfully updated by the teacher. | |
| Flow of Activity | TEACHER | SYSTEM |
| | 1. Manage student records and view account details also by adding and removing them. | 1.1 The system will successfully update the student record. |

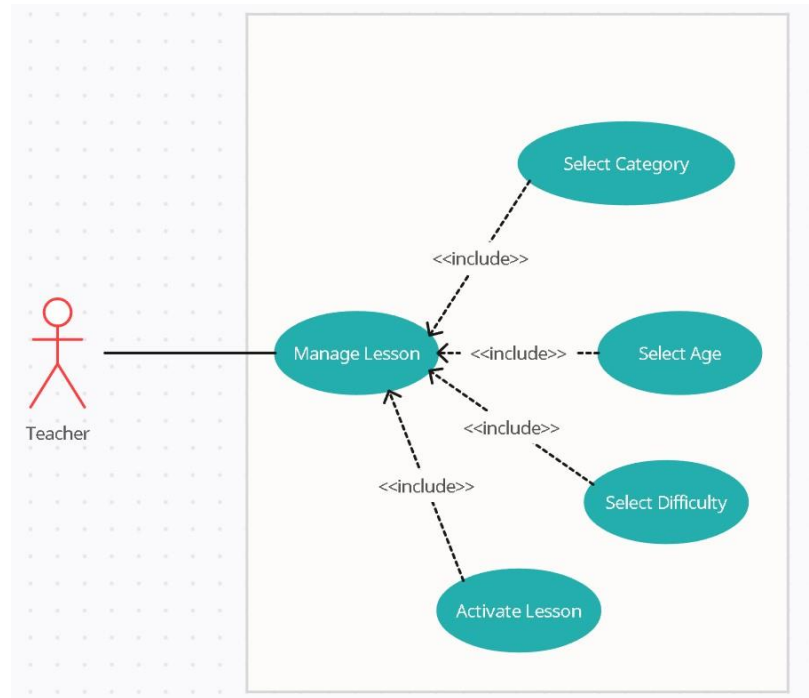


Figure 29: **System Use Case Model – MANAGE LESSON**

| Use Case Name | Manage Student Lesson | |
|-------------------|--|---|
| Purpose | To manage and activate the student lesson | |
| Triggering Actor | Teacher | |
| Brief Description | Teachers can manage the lesson by selecting category, age, difficulty and activate lesson. | |
| Pre-Condition | Selecting category, age, difficulty to activate the lesson | |
| Post-Condition | Students are able to participate in the lesson. | |
| Flow of Activity | TEACHER | SYSTEM |
| | 1. Manage student lesson by selecting category, age, difficulty to activate the lesson | 1.1 The system will successfully activate the lesson, allowing the student to play. |

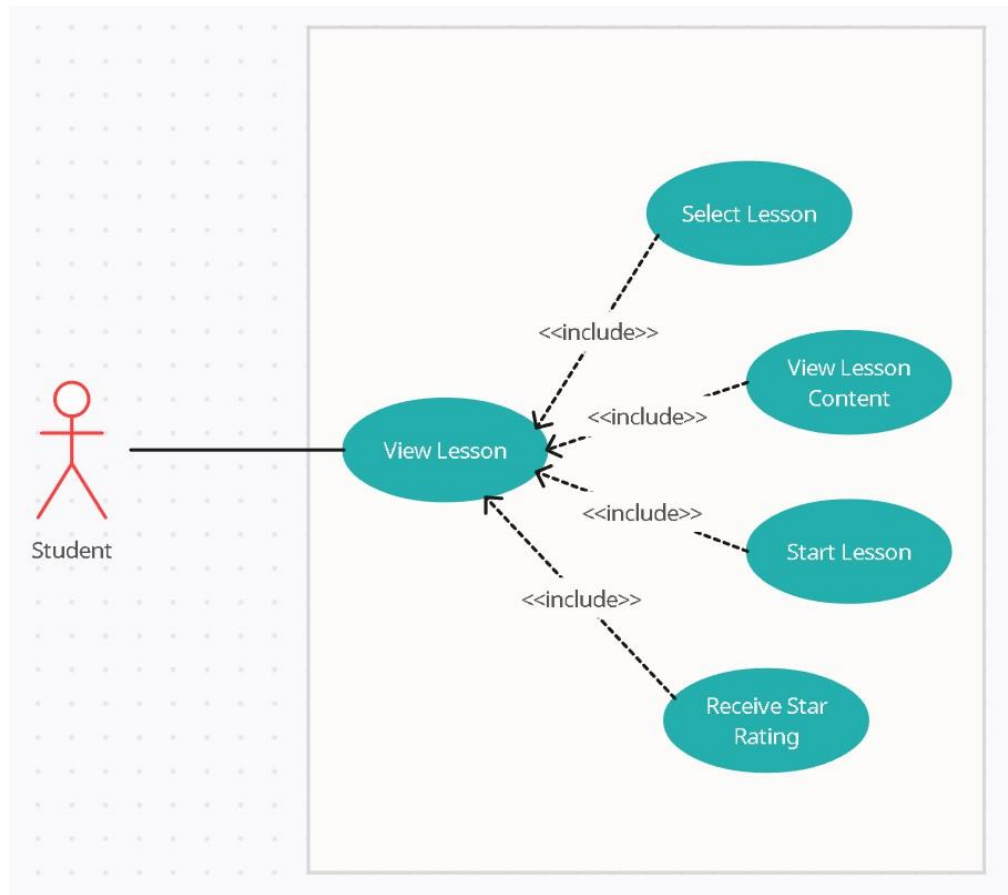


Figure 30: **System Use Case Model – VIEW LESSON**

| Use Case Name | View Student Lesson | |
|-------------------|---|---|
| Purpose | To start the lesson | |
| Triggering Actor | Student | |
| Brief Description | Students can view and select the lesson to start once the teacher has activated it. | |
| Pre-Condition | The teacher has successfully activated the lesson. | |
| Post-Condition | Students are able to participate in the lesson. | |
| Flow of Activity | STUDENT | SYSTEM |
| | 1. View and select a lesson to start playing | 1.1 The system will start the game so that the student can participate. |

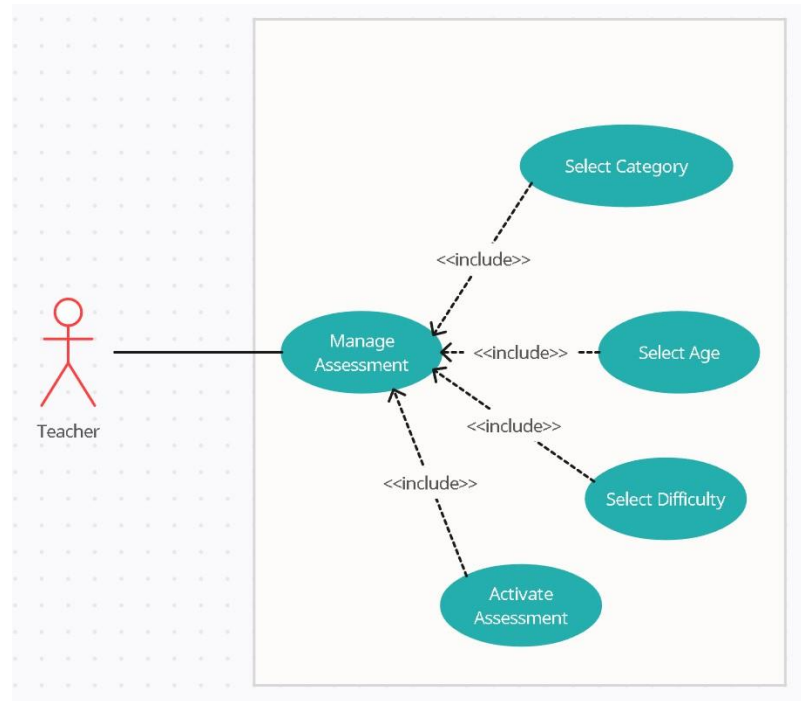


Figure 31: **System Use Case Model – MANAGE ASSESSMENT**

| Use Case Name | Manage Assessment | |
|-------------------|---|---|
| Purpose | To manage and activate the student assessment | |
| Triggering Actor | Teacher | |
| Brief Description | Lessons and assessments are activated in the same way, but the assessment games differ from the lesson games. The assessment games combine all three lessons which is Color Guess, Count & Play, and Learning ABC's | |
| Pre-Condition | Selecting category, age, difficulty to activate the assessment | |
| Post-Condition | Students are able to participate in the assessment | |
| Flow of Activity | TEACHER | SYSTEM |
| | 1. Manage student lesson by selecting category, age, difficulty to activate the lesson | 1.1 The system will successfully activate the assessment, allowing the student to play. |

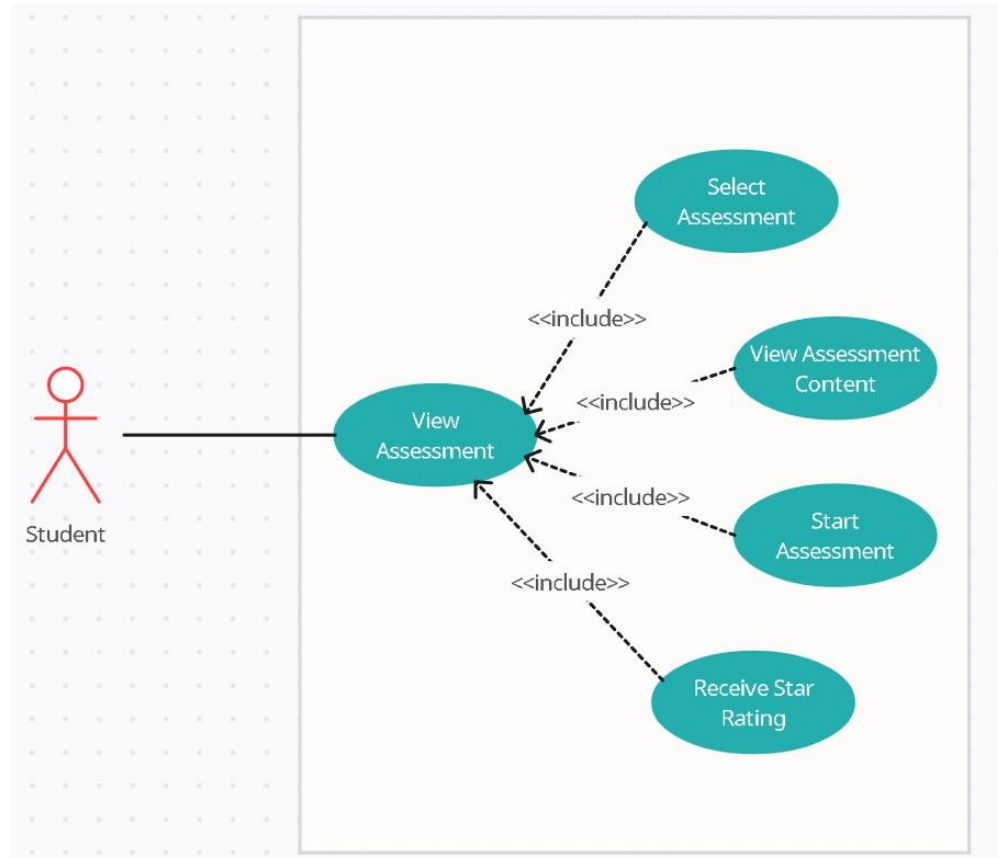


Figure 32: **System Use Case Model – MANAGE ASSESSMENT**

| Use Case Name | Student View Assessment | |
|-------------------|---|---|
| Purpose | To start the assessment | |
| Triggering Actor | Student | |
| Brief Description | Students can view and select the assessment to start once the teacher has activated it. | |
| Pre-Condition | The teacher has successfully activated the assessment. | |
| Post-Condition | Students are able to participate in the assessment. | |
| Flow of Activity | STUDENT | SYSTEM |
| | 1. View and select assessment to start playing. | 1.1 The system will start the game so that the student can participate. |

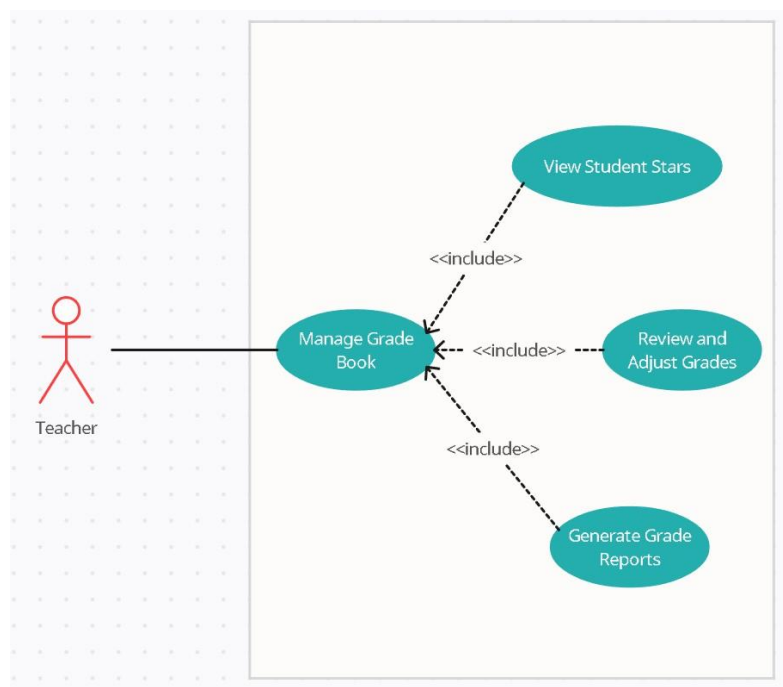


Figure 33: **System Use Case Model – MANAGE GRADE BOOK**

| Use Case Name | Student View Assessment | |
|-------------------|---|--|
| Purpose | To manage and view student grades. | |
| Triggering Actor | Teacher | |
| Brief Description | Teacher can manage the student grade and generate reports | |
| Pre-Condition | Teachers review and adjust grades before sending them to students. | |
| Post-Condition | Students are able to view and receive their grades | |
| Flow of Activity | TEACHER | SYSTEM |
| | 1. Manage student grades by viewing the stars, reviewing and adjusting them to generate reports." | 1.1 The system will send the grades to the students. |

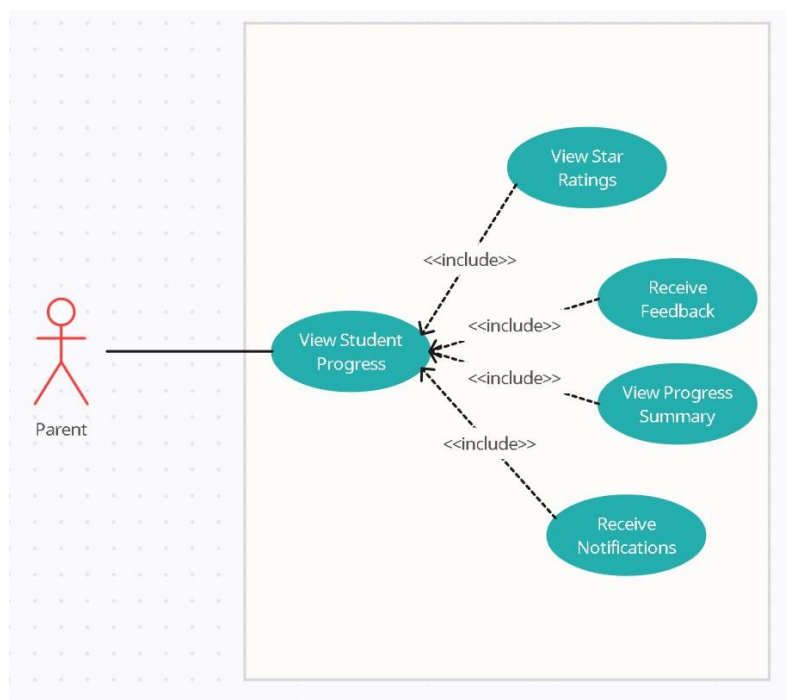


Figure 34: **System Use Case Model – VIEW STUDENT PROGRESS**

| Use Case Name | View Student Progress | |
|-------------------|--|---|
| Purpose | View student progress based on their performance. | |
| Triggering Actor | Parent | |
| Brief Description | Parents are allowed to view student progress, since the children still not be familiar with it. | |
| Pre-Condition | Students participate in every category, including lessons and assessments. | |
| Post-Condition | Parents are able to receive progress reports based on their child's performance. | |
| Flow of Activity | PARENT | SYSTEM |
| | 1. Students participate in every category, including lessons and assessments. The parent will view the student's progress. | 1.1 The system will display the student's progress once they have participated in both lessons and assessments. |

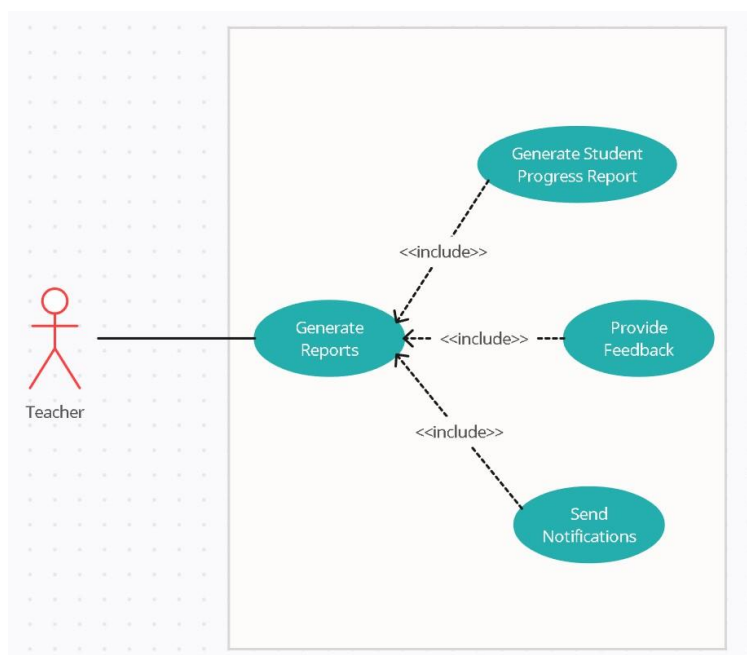


Figure 35: **System Use Case Model – GENERATE REPORTS**

| Use Case Name | Teacher Generate Reports | |
|--------------------------|---|---|
| Purpose | Provide Feedback and send notification to student | |
| Triggering Actor | Teacher | |
| Brief Description | Teachers can provide reports to give feedback to students. | |
| Pre-Condition | View students' performance and notify them by providing feedback. | |
| Post-Condition | Students are able to receive feedback from their teachers. | |
| Flow of Activity | TEACHER | SYSTEM |
| | 1. Teacher generate reports by providing feedback to students, allowing them to see their progress. | 1.1 The system will send notifications to students, allowing them to view their progress and feedback from their teacher. |

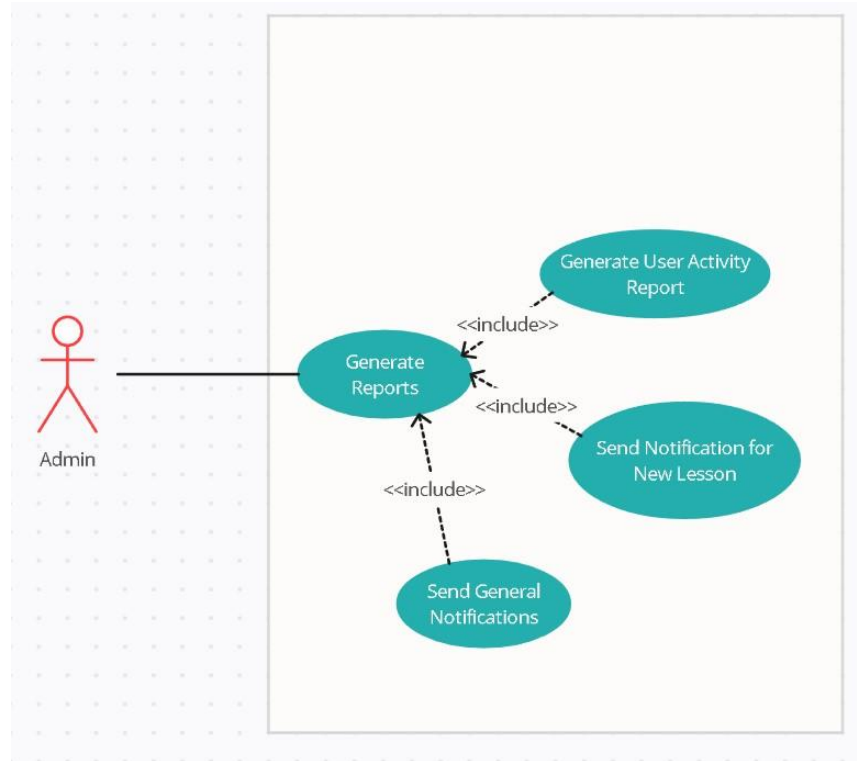


Figure 36: **System Use Case Model – GENERATE REPORTS**

| Use Case Name | Admin Generate Reports | |
|-------------------|--|---|
| Purpose | All accounts can receive system updates. | |
| Triggering Actor | Admin | |
| Brief Description | Admins can send updates to both student and teacher accounts. | |
| Pre-Condition | Adding new lesson and assessment, also notify them for the new updates. | |
| Post-Condition | Both student and teacher accounts can receive new system updates. | |
| Flow of Activity | ADMIN | SYSTEM |
| | 1. Adding new lesson and assessment, also notify them for the new updates. | 1.1 The system will send notifications to all accounts. |

Storyboard Diagram

It is a graphic organizer in a form of illustrations or images displayed in sequence for pre-visualizing a motion picture, animation, motion graphic, or interactive media sequence.

Module Name: Process Registration

Screen No: 1

Screen Name: Sign Up

Description: User registration is where they fill out the form in order to create an account.

Figure 37: Sign-Up Account

| ITEMS | TYPE | REQUIRED? | DATA TYPE | SIZE |
|------------|---------|-----------|-----------|------|
| First Name | Textbox | Yes | String | 50 |
| Last Name | Textbox | Yes | String | 50 |

| ITEMS | TYPE | REQUIRED? | DATA TYPE | SIZE |
|------------------|-----------|-----------|-----------|------|
| Email | Textbox | Yes | String | 50 |
| Password | Textbox | Yes | String | 50 |
| Confirm Password | Textbox | Yes | String | NA |
| Birthdate | Button | Yes | NA | NA |
| Select an Option | Combo box | Yes | NA | NA |
| Create Account | Button | Yes | NA | NA |
| Log in | Link Text | Yes | NA | NA |

Logic:

1. Fill out the information needed to create an account including the birthdate also it must need to select an option either Student or Teacher and press Create Account button to create the account.
2. Only parents are allowed to create the student account.
3. If you already have an account just press the small Login highlighted word to redirect to login account.

Module Name: Process Login

Screen No: 2

Screen Name: Login

Description: To access the main page, the user must log in to their registered account.

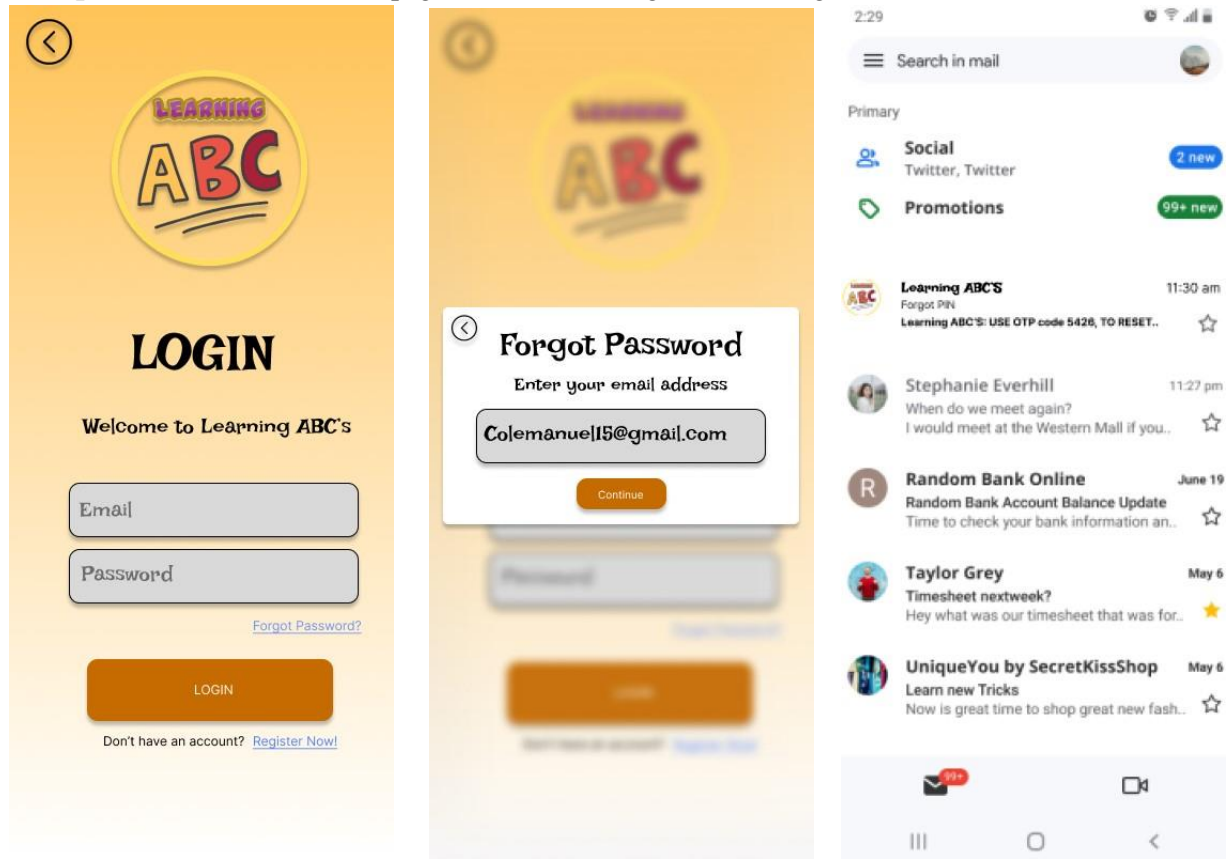


Figure 38: Log in Account and Forgot Password

| ITEMS | TYPE | REQUIRED? | DATA TYPE | SIZE |
|-----------------|-----------|-----------|-----------|------|
| Email | Textbox | Yes | String | 50 |
| Password | Textbox | Yes | String | 50 |
| Login | Button | Yes | NA | NA |
| Forgot Password | Button | Yes | NA | NA |
| Register Now | Link Text | Yes | NA | NA |

Logic:

1. The user will enter their login information, and if it is wrong, it will prompt a message that the information entered was incorrect. If it is correct, it will login after pressing the login button.
 - 1.2. There is a forgot password button where the user can reset its password if the user can provide the information needed to reset the password.
2. If you still don't have an account you can just press the Register Now! Button to redirect the user to the Signup Page.

Module Name: Manage Account

Screen No: 3

Screen Name: Teacher Manage Account

Description: Teachers are able to view and manage their accounts.



The screenshot displays a mobile application interface for managing a teacher's account. At the top, there is a back arrow icon and the title "Settings". Below the title is a circular profile picture of a man with glasses, labeled "Paul Ngujo". The form contains three main sections: "Name" with a text input field and a "Change account" link; "E-mail" with a text input field; and "Background Music" with a toggle switch. At the bottom of the screen is a large orange button labeled "SIGN OUT".

Figure 39: **Teacher Manage Account**

| ITEMS | TYPE | REQUIRED? | DATA TYPE | SIZE |
|------------------|-----------|-----------|-----------|------|
| Change Account | Link Text | Yes | NA | NA |
| Name | Textbox | Yes | String | 50 |
| Email | Textbox | Yes | String | 50 |
| Background Music | Button | Yes | NA | NA |
| Sign Out | Button | Yes | NA | NA |

Logic:

1. Teachers are able to view and manage their accounts through the settings.
2. There is a background music button where users can turn it on or off.
3. Users can also sign out if they wish to.

Module Name: Manage Account

Screen No: 4

Screen Name: Student Manage Account

Description: Only parents are allowed to make significant changes to the student's account. This is because being children, might not yet have the experience or understanding to manage their accounts properly. Parents can guide and oversee these tasks to ensure everything is handled correctly.

Figure 40: Student Manage Account

| ITEMS | TYPE | REQUIRED? | DATA TYPE | SIZE |
|------------------|-----------|-----------|-----------|------|
| Change Account | Link Text | Yes | NA | NA |
| Name | Textbox | Yes | String | 50 |
| Email | Textbox | Yes | String | 50 |
| Id number | Textbox | Yes | Int | 50 |
| Background Music | Button | Yes | NA | NA |
| Sign Out | Button | Yes | NA | NA |

Logic:

1. Only parents are allowed to manage the student account, as children may not be familiar with how to handle account management.
2. There is a background music button where users can turn it on or off.
3. Users can also sign out if they wish to.

Module Name: Manage Account

Screen No: 5

Screen Name: Admin Manage Account

Description: Admin can also manage both student and teacher accounts.

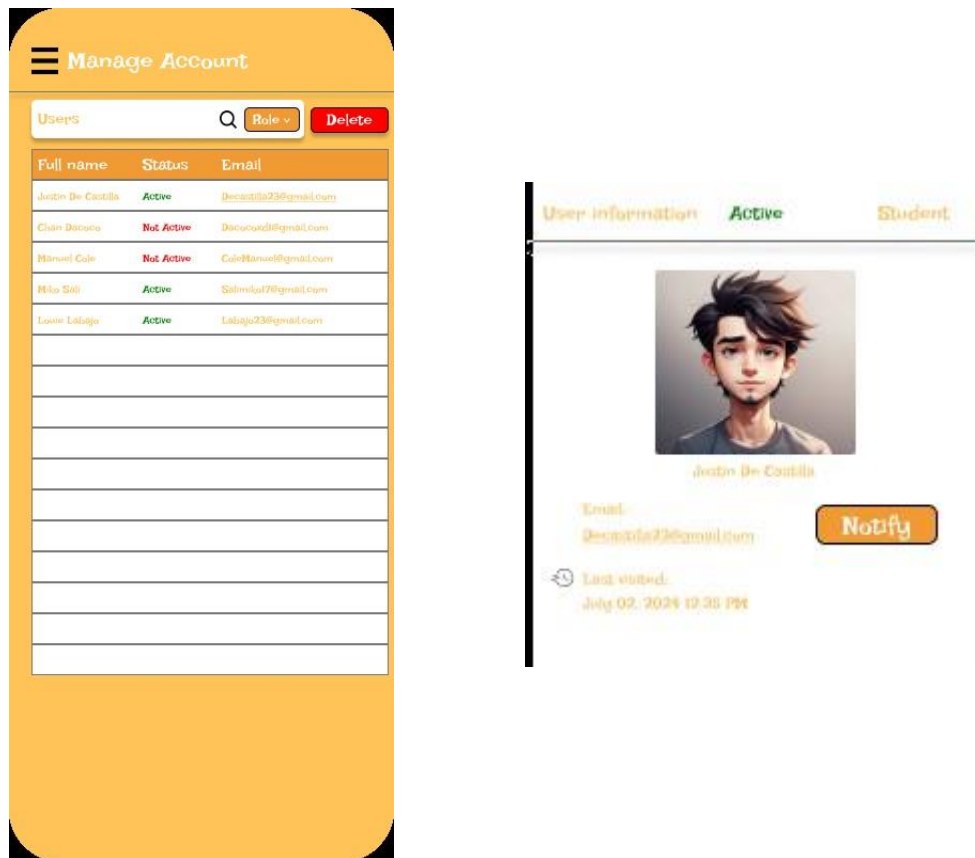


Figure 41: Student Manage Account

| ITEMS | TYPE | REQUIRED? | DATA TYPE | SIZE |
|-------|---------|-----------|-----------|------|
| Users | Textbox | Yes | String | 50 |

| | | | | |
|-----------|-----------|-----|--------|----|
| Role | Combo box | Yes | NA | NA |
| Delete | Button | Yes | NA | NA |
| Full name | Text | Yes | String | 50 |
| Status | Text | Yes | String | 50 |
| Email | Text | Yes | String | 50 |
| Notify | Button | Yes | NA | NA |

Logic:

1. Admin can manage both student and teacher accounts by viewing their details, deleting accounts if necessary, and notifying users of updates.

Module Name: Manage Student Record

Screen No: 6

Screen Name: Student Record

Description: Teachers can manage student records by viewing their account details.

| Student ID | Full Name | Age | E-mail |
|------------|---------------------|-----|----------------|
| 22210157 | Cole, Manuel J. | 2 | Cole@gmail.com |
| 2232020 | Dacoco, Chan B. | 2 | Sali@gmail.com |
| 22210157 | Sali, Amir Alden F. | 3 | Chan@gmail.com |
| 2232020 | Labajo, Louie Jay | 5 | Jay@gmail.com |
| 22210157 | De Castilla, Justin | 4 | Wala@gmail.com |

Figure 42: Manage Student Record

| ITEMS | TYPE | REQUIRED? | DATA TYPE | SIZE |
|----------------|---------|-----------|-----------|------|
| Search Student | Textbox | Yes | String | 50 |
| Search | Button | Yes | NA | NA |
| Student ID | Text | Yes | Int | 50 |
| Full name | Text | Yes | String | 50 |
| Age | Text | Yes | Int | 50 |
| Email | Text | Yes | String | 50 |
| Add | Button | Yes | NA | NA |

| | | | | |
|--------|--------|-----|----|----|
| Remove | Button | Yes | NA | NA |
|--------|--------|-----|----|----|

Logic:

1. Teachers can view student records, including the student's ID number, full name, age, and registered email
2. It can add and remove students.

Module Name: Manage Lesson

Screen No: 7

Screen Name: Manage Student Lesson

Description: Teachers can manage student lessons by activating them, selecting difficulty levels, and choosing the appropriate age range.

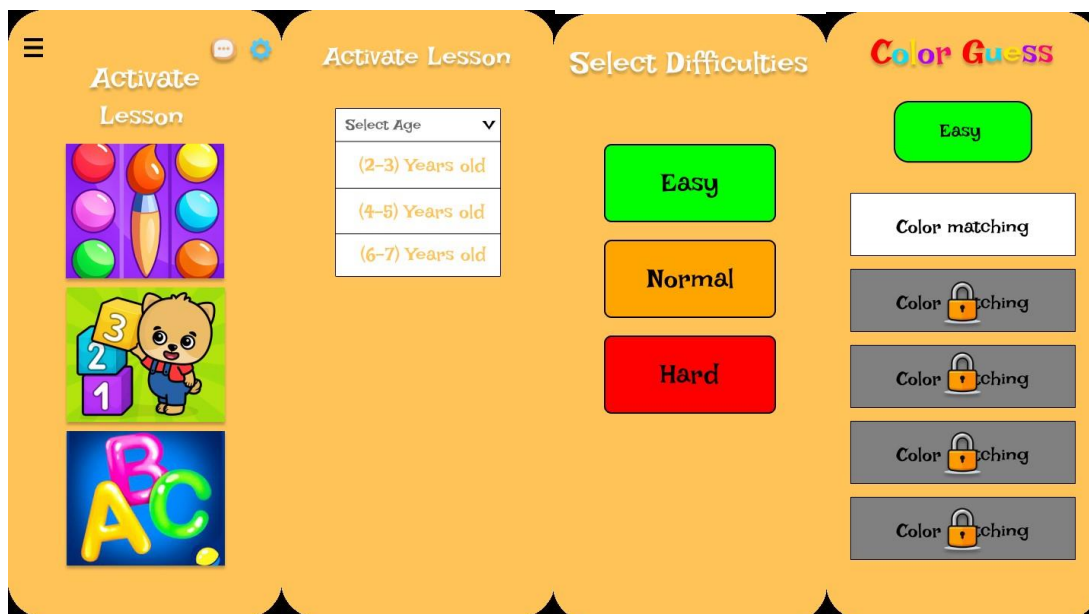


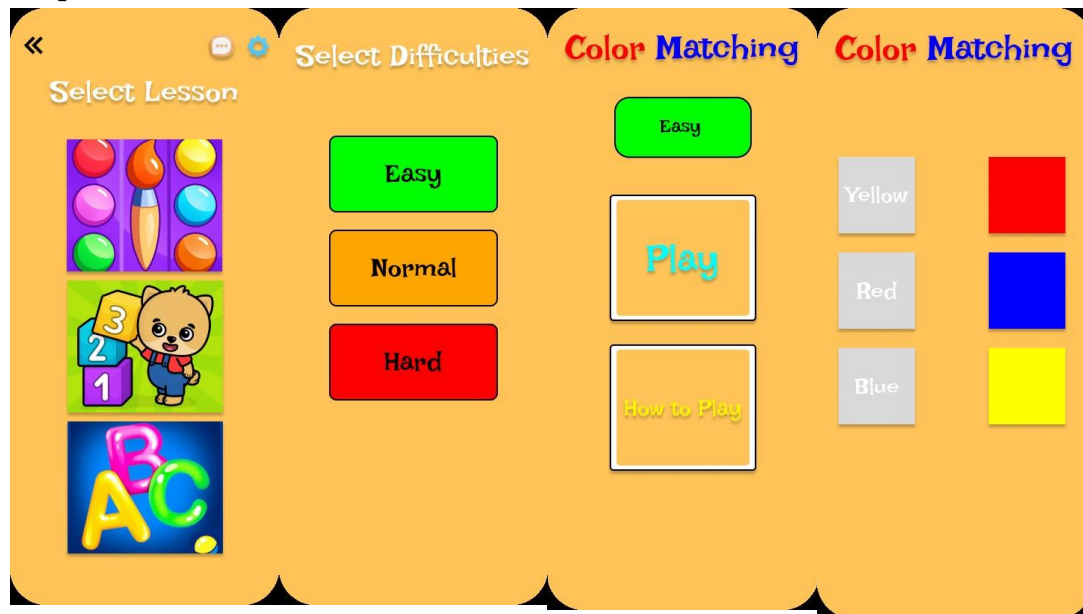
Figure 43: Manage Student Lesson

| ITEMS | TYPE | REQUIRED? | DATA TYPE | SIZE |
|-----------------|-----------|-----------|-----------|------|
| Student Lessons | Button | Yes | NA | NA |
| Select Age | Combo box | Yes | Int | 50 |

| | | | | |
|---------------------|--------|-----|----|----|
| Select Difficulties | Button | Yes | NA | NA |
| Activate Lessons | Button | Yes | NA | NA |

Logic:

- Teachers can manage student lessons by selecting the lesson, age, difficulty level, and then activating the lesson.

Module Name: View Lesson**Screen No:** 8**Screen Name:** View Student Lesson**Description:** Students can view and access the lesson once the teacher has activated it.Figure 44: View Lesson

| ITEMS | TYPE | REQUIRED? | DATA TYPE | SIZE |
|---------------------|--------|-----------|-----------|------|
| Student Lessons | Button | Yes | NA | NA |
| Select Difficulties | Button | Yes | NA | NA |
| Play | Button | Yes | NA | NA |

| | | | | |
|-------------|--------|-----|----|----|
| How to Play | Button | Yes | NA | NA |
|-------------|--------|-----|----|----|

Logic:

1. Teachers must first activate the lesson for students to be able to play the game.
2. Students can select lessons and difficulty levels to access the game, which also includes rules and guidelines.

Module Name: Manage Assessment

Screen No: 9

Screen Name: Manage Student Assessment

Description: Teachers can also manage assessments in the same way as they manage lessons.

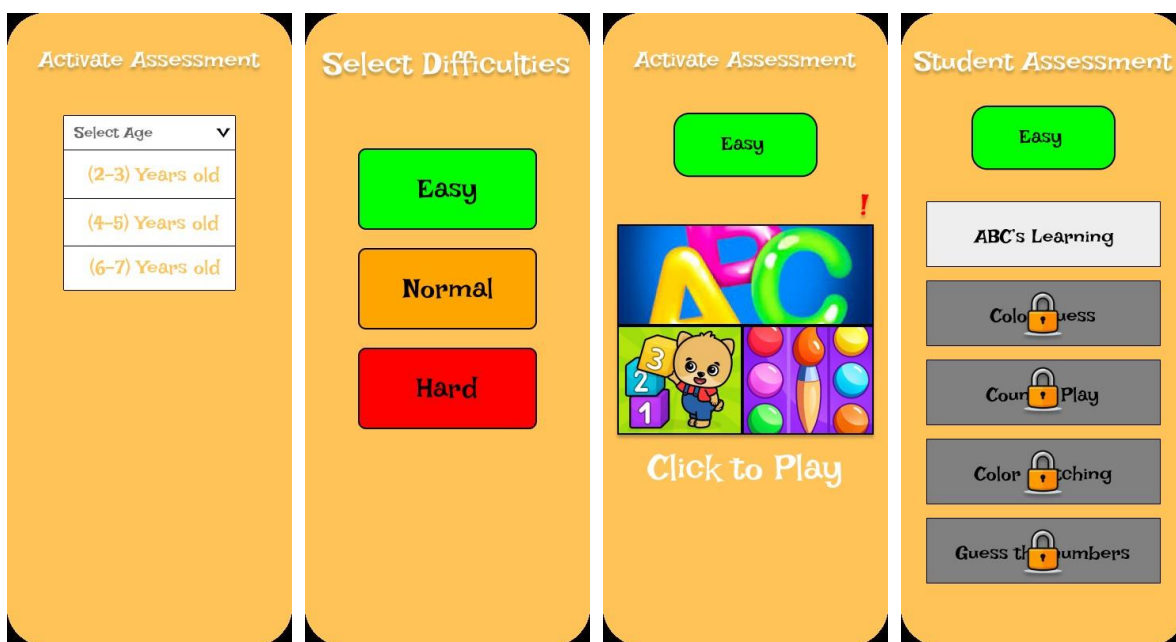


Figure 45: Manage Student Assessment

| ITEMS | TYPE | REQUIRED? | DATA TYPE | SIZE |
|---------------------|-----------|-----------|-----------|------|
| Select Age | Combo box | Yes | NA | NA |
| Select Difficulties | Button | Yes | NA | NA |

| | | | | |
|---------------------|--------|-----|----|----|
| Click to Play | Button | Yes | NA | NA |
| Activate Assessment | Button | Yes | NA | NA |

Logic:

1. Teachers can also manage assessments in the same way as they manage lessons.
2. All the games are compiled into the assessment. When a student clicks the image to play, all the lessons will appear in a random order, including topics such as colors, counting, play, and learning ABCs.

Module Name: View Assessment

Screen No: 10

Screen Name: View Student Assessment

Description: Similar to the lessons, students can view and play the assessment once the teacher has activated it.

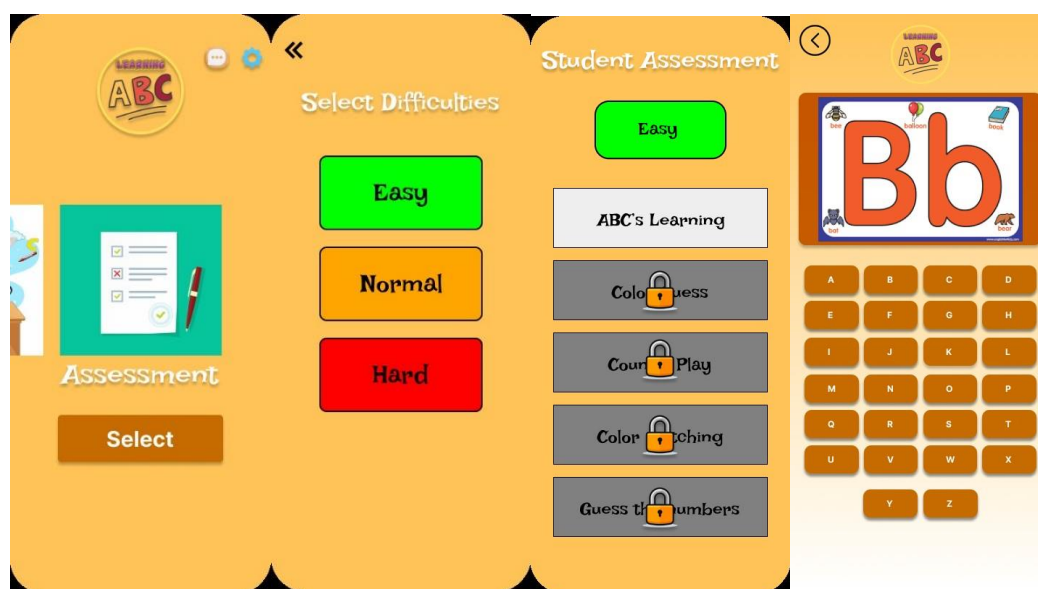


Figure 46: View Assessment

| ITEMS | TYPE | REQUIRED? | DATA TYPE | SIZE |
|-------------------|--------|-----------|-----------|------|
| Select Assessment | Button | Yes | NA | NA |

| | | | | |
|---------------------|--------|-----|----|----|
| Select Difficulties | Button | Yes | NA | NA |
| Student Assessment | Button | Yes | NA | NA |

Logic:

1. Students are able to access the assessment once the teacher has activated it.
2. Once the student selects a difficulty level, all assessments will be displayed, including various games such as the color game, count & play, and learning ABCs.

Module Name: Manage Grade Book

Screen No: 11

Screen Name: Manage Student Grade

Description: Teachers are able to manage student's grades.

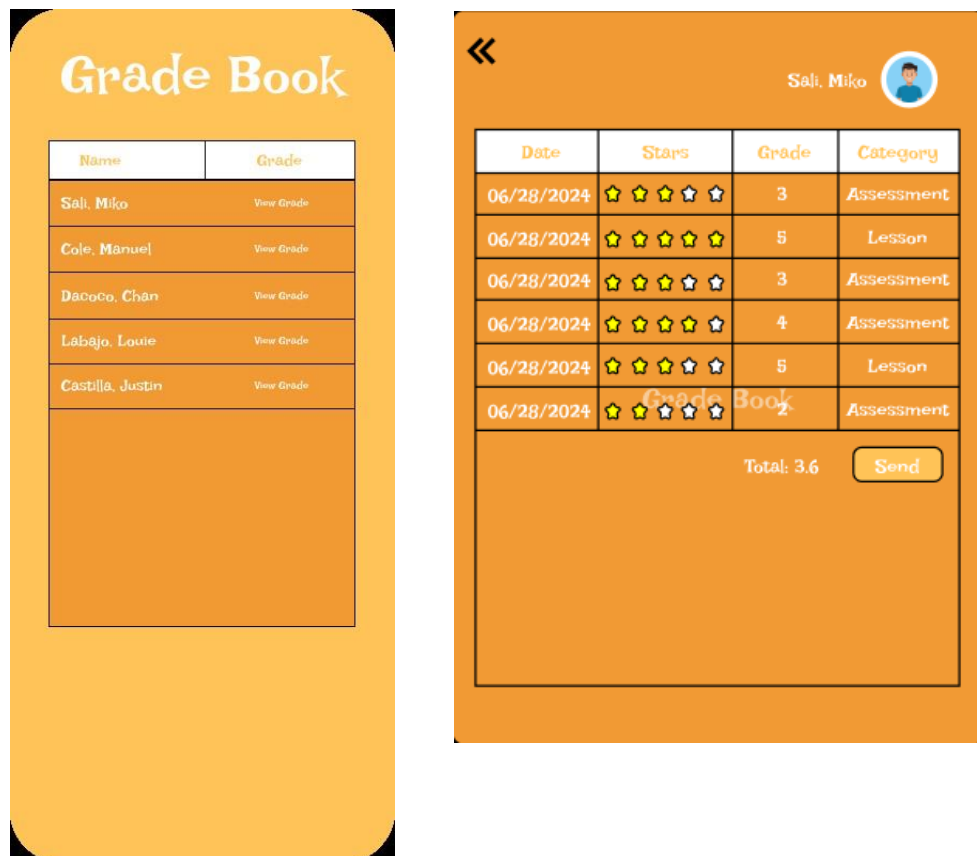


Figure 47: Manage Grade Book

| ITEMS | TYPE | REQUIRED? | DATA TYPE | SIZE |
|----------|--------|-----------|-----------|------|
| Name | Text | Yes | 50 | 50 |
| Grade | Text | Yes | 50 | 50 |
| Date | Text | Yes | 50 | 50 |
| Stars | Button | Yes | NA | NA |
| Category | Text | Yes | 50 | 50 |
| Send | Button | Yes | NA | NA |

Logic:

1. Teachers can manage students' grades, where stars are converted into numbers and reported to the students so they can view their grades.

Module Name: View Student Progress

Screen No: 12

Screen Name: Student Progress

Description: Students can view their progress, but only parents can access the full details.

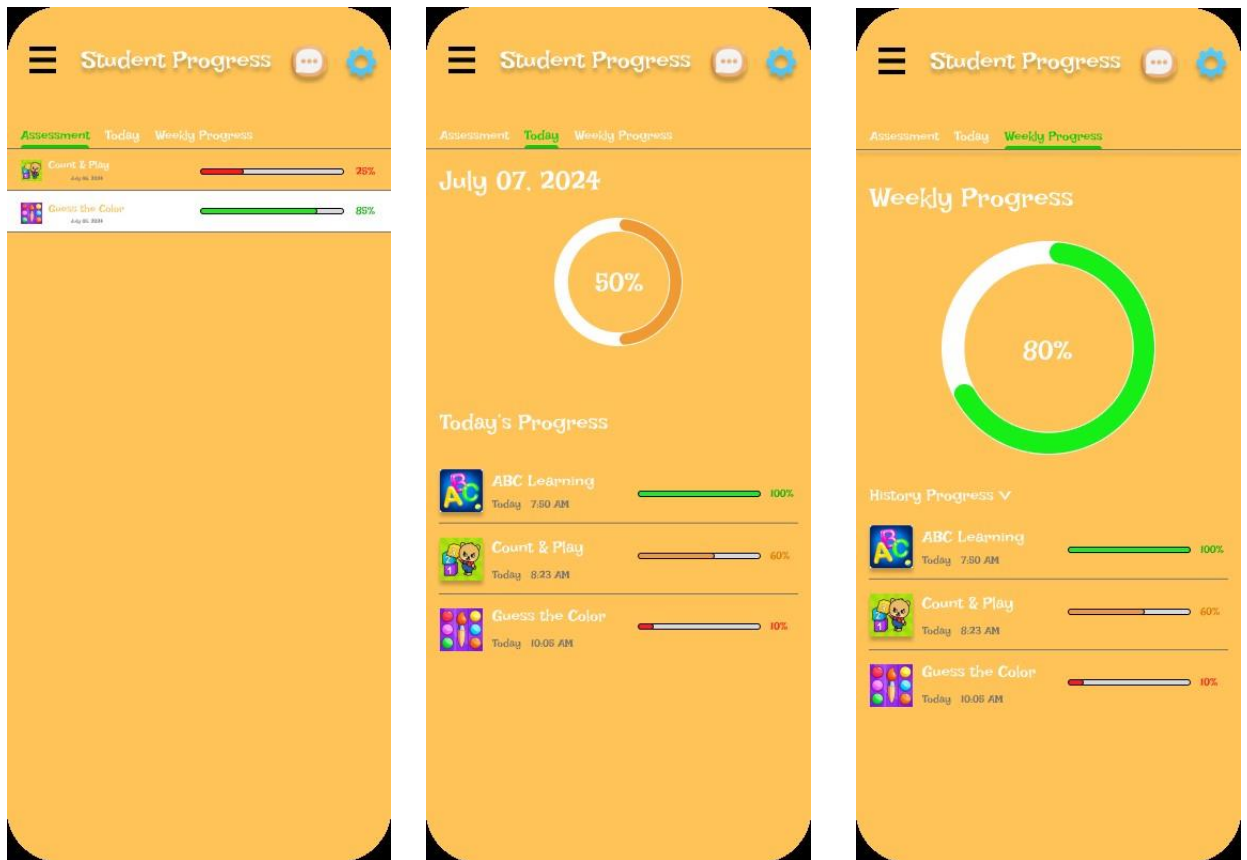


Figure 48: **View Student Progress**

| ITEMS | TYPE | REQUIRED? | DATA TYPE | SIZE |
|-----------------|------|-----------|-----------|------|
| Assessment | Text | Yes | NA | NA |
| Today | Text | Yes | NA | NA |
| Weekly Progress | Text | Yes | NA | NA |

Logic:

1. The teacher can monitor students' progress and view three different types: assessment progress, daily progress, and weekly progress.

Module Name: Teacher Generate Reports

Screen No: 13

Screen Name: Generate Reports

Description: Teachers can generate reports by providing feedback to students.

| Date | Stars | Grade | Category |
|------------|-------|-------|------------|
| 06/28/2024 | ☆☆☆☆☆ | 3 | Assessment |
| 06/28/2024 | ☆☆☆☆☆ | 5 | Lesson |
| 06/28/2024 | ☆☆☆☆☆ | 3 | Assessment |
| 06/28/2024 | ☆☆☆☆☆ | 4 | Assessment |
| 06/28/2024 | ☆☆☆☆☆ | 5 | Lesson |
| 06/28/2024 | ☆☆☆☆☆ | 2 | Assessment |

Total: 3.6 Send

Confirm

Send Feedback?

Yes No

Figure 49: Teacher Generate Reports

| ITEMS | TYPE | REQUIRED? | DATA TYPE | SIZE |
|----------|--------|-----------|-----------|------|
| Grade | Text | Yes | 50 | 50 |
| Date | Text | Yes | 50 | 50 |
| Stars | Button | Yes | NA | NA |
| Category | Text | Yes | 50 | 50 |
| Send | Button | Yes | NA | NA |
| Confirm | Button | Yes | NA | NA |

Logic:

1. Teacher can generate reports to student by reviewing and adjust the grade and notify them for the feedback.

Module Name: Admin Generate Reports

Screen No: 14

Screen Name: Generate reports for the users

Description: Admin are able to send reports to both student and teacher accounts.

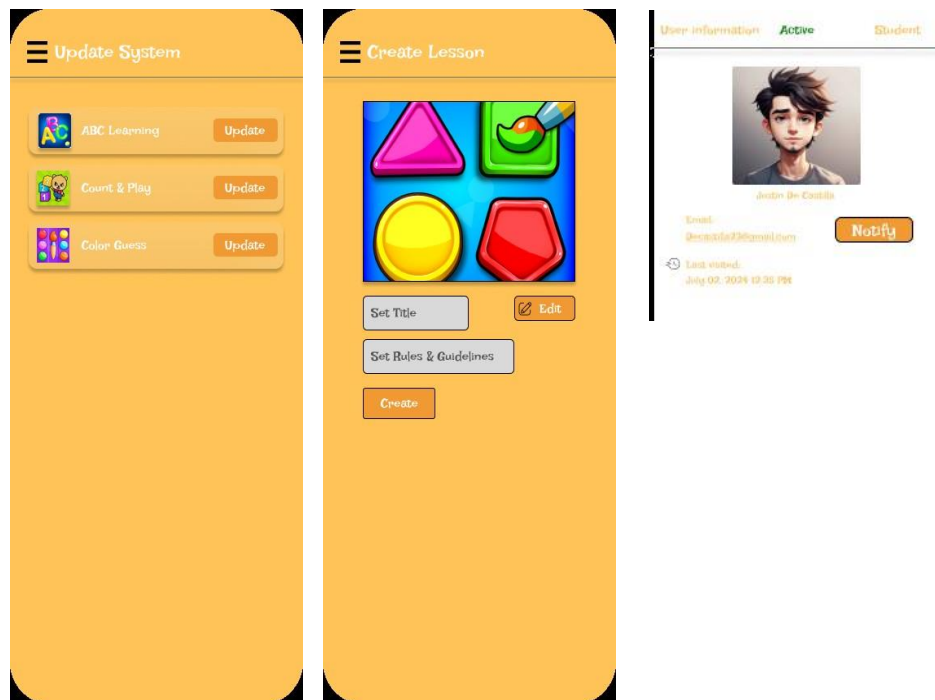


Figure 50: Admin Generate Reports

| ITEMS | TYPE | REQUIRED? | DATA TYPE | SIZE |
|------------------------|---------|-----------|-----------|------|
| Update | Button | Yes | NA | NA |
| Set Title | Textbox | Yes | String | 50 |
| Set Rules & Guidelines | Textbox | Yes | String | 50 |

| | | | | |
|--------|--------|-----|----|----|
| Create | Button | Yes | NA | NA |
| Edit | Button | Yes | NA | NA |

Logic:

1. Admin can notify both student and teacher accounts about updates, including the addition of new lessons and assessment.

Database Design. Database design entails developing a comprehensive model of data structures and their interrelationships to facilitate efficient storage, retrieval, and management. This process is vital for systems that depend on data, including web applications, information systems, and any project managing substantial data volumes.

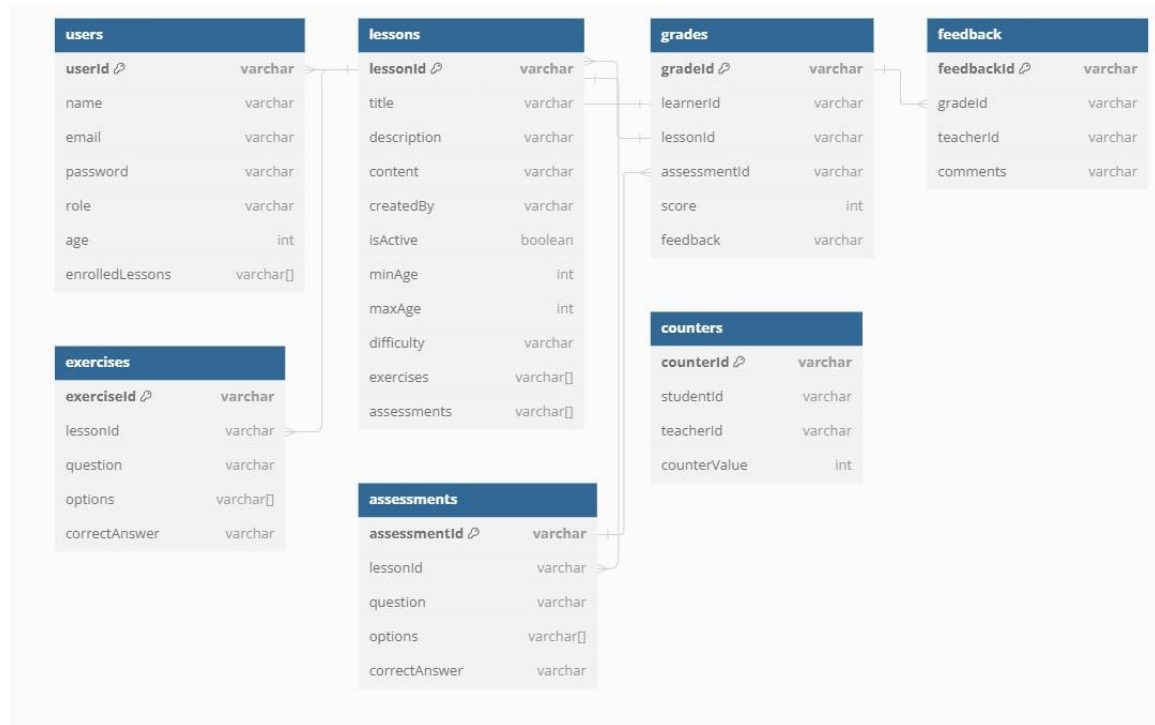


Figure 51: **Database Design of Learning ABC's**

Entity-Relationship Diagram. An Entity-Relationship Diagram (ERD) is a visual tool that illustrates the data entities and their interconnections within a system. It plays a crucial role in database design by mapping out the logical structure of databases. An ERD shows entities, attributes, and relationships, clearly showing how data is organized and related.

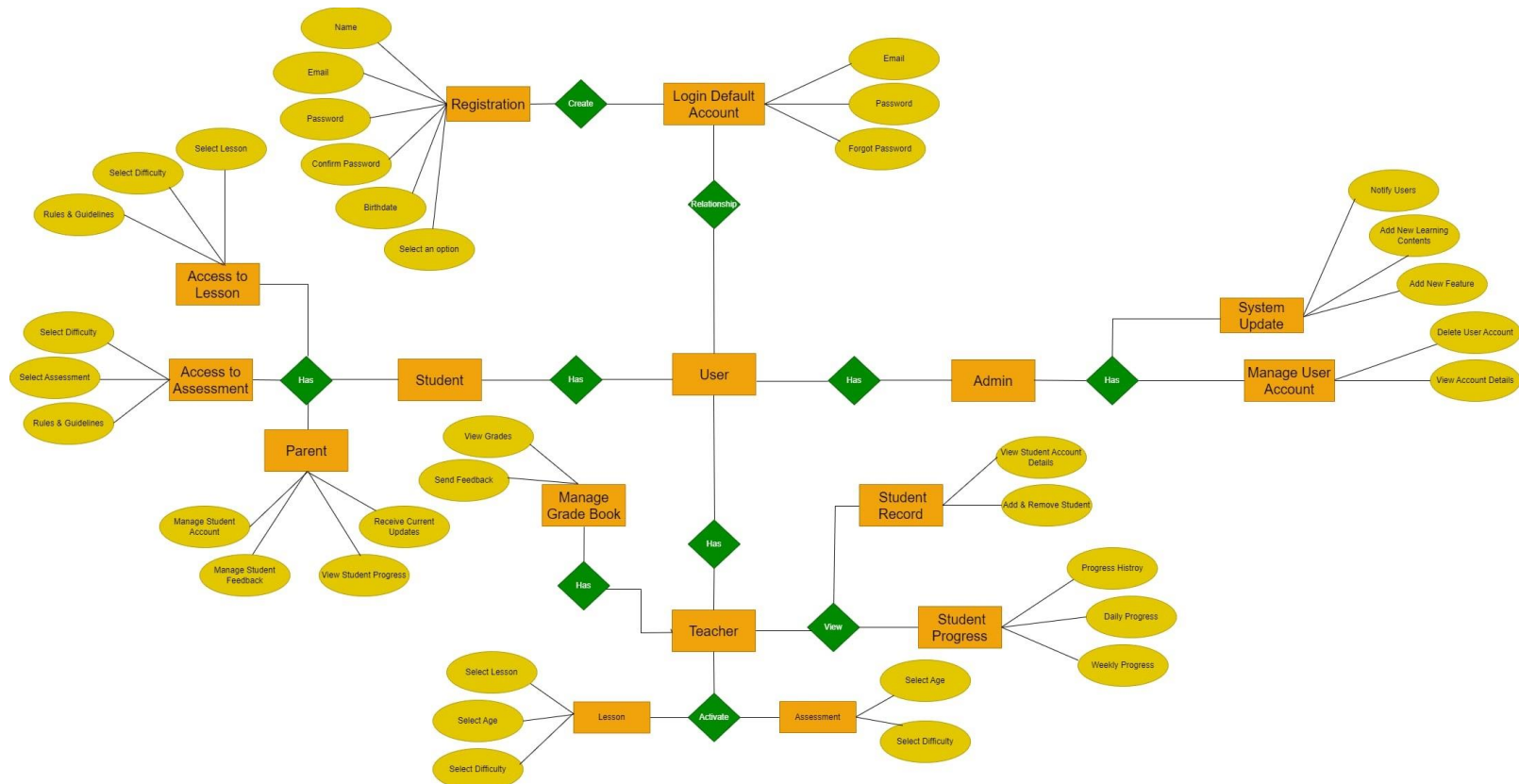


Figure 52: **Entity-Relationship Diagram of LEARNING ABC's**

Data Dictionary

A data dictionary provides a concise summary of key data elements and their relationships within a database. It serves as a reference tool for stakeholders to understand the structure, definitions, and usage of data, ensuring consistency and facilitating effective data management.

Table 2

DATA DICTIONARY OF USERS

| Fields Name | Constraints | Data Type | Allow Nulls | Description |
|-----------------|-------------|-----------|-------------|--|
| userId | PK | INT | NO | Unique identifier of the user. |
| name | NOT NULL | VARCHAR | NO | Full name of user. |
| email | NOT NULL | VARCHAR | NO | Active email of the user. |
| password | NOT NULL | VARCHAR | NO | Password of the user that also be match with the email |
| role | NOT NULL | INT | NO | Role of the user who is going to use |
| enrolledLessons | NOT NULL | VARCHAR | NO | Enrolled lessons for students to study. |
| createdLessons | NOTNULL | VARCHAR | NO | Lesson creation for students to learn |

This table contains details about system users, including their unique identifiers, names, contact information, roles, and their involvement with lessons. Each user is assigned a unique ID and role that defines their permissions and activities within the system. Additionally, the table records the lessons that users are enrolled in or have created.

Table 3

DATA DICTIONARY OF LESSONS

| Fields Name | Constraints | Data Type | Allow Nulls | Description |
|--------------------|--------------------|------------------|--------------------|---|
| lessonId | PK | VARCHAR | NO | Unique identifier of the Lessons. |
| title | NOT NULL | VARCHAR | NO | Title of the specific lesson. |
| description | NOT NULL | VARCHAR | NO | A short description of the title |
| content | NOT NULL | VARCHAR | NO | Nickname of the Parent |
| createdBy | NOT NULL | VARCHAR | NO | Identifier of the user who created the lesson |
| isActive | NOT NULL | BOOLEAN | NO | Indicates if the record is active (TRUE) or inactive (FALSE). |
| minAge | NOT NULL | INT | NO | Specifies the minimum age requirement for the record, used to |

| | | | | |
|-------------|----------|---------|----|---|
| | | | | filter or categorize based on age eligibility. |
| maxAge | NOT NULL | INT | NO | Specifies the maximum age limit for the record, used with minAge to define the eligible age range. |
| difficulty | NOT NULL | VARCHAR | NO | This field indicates the difficulty level of the record, storing values like "Easy," "Medium," or "Hard." |
| exercises | NOT NULL | VARCHAR | NO | Exercises associated with the lessons |
| assessments | NOT NULL | VARCHAR | NO | Assessments linked to the lessons |

This table stores information about the lessons available in the system. Each lesson has a unique identifier, title, description, content, creator, exercises, and assessments.

Table 4
DATA DICTIONARY OF EXERCISES

| Fields Name | Constraints | Data Type | Allow Nulls | Description |
|---------------|-------------|-----------|-------------|--|
| exerciseId | PK | VARCHAR | NO | Unique identifier of the exercise. |
| lessonId | NOT NULL | VARCHAR | NO | .Identifier of the lesson to which the exercise belongs. |
| question | NOT NULL | VARCHAR | NO | The question posed in the exercise |
| options | NOT NULL | VARCHAR | NO | Possible answer options for the questions |
| correctAnswer | NOT NULL | VARCHAR | NO | The correct answer for the exercise question. |

The Exercise table is a crucial component of the lesson management system, designed to store detailed information about individual exercises within each lesson. It includes several fields, each serving a specific purpose to ensure the accurate representation of an exercise. The exerciseId is a unique identifier for each exercise, serving as the primary key to ensure distinct entries. The lessonId field links each exercise to a specific lesson, establishing a relationship between the exercise and its corresponding lesson. The question field contains the actual question posed in the exercise, while the options field lists the possible answer choices available to the student. Lastly, the correctAnswer field stores the correct answer for the exercise, essential for evaluating student responses. All fields are required, meaning they do not allow null values, ensuring that each exercise is fully defined and can be accurately assessed. The data for these fields is stored as VARCHAR, accommodating the text-based nature of the questions and answers.

Table 5
DATA DICTIONARY FOR ASSESSMENTS

| Fields Name | Constraints | Data Type | Allow Nulls | Description |
|---------------|-------------|-----------|-------------|---|
| assessmentId | PK | VARCHAR | NO | Unique identifier of the assessment |
| lessonId | NOT NULL | VARCHAR | NO | Identifier of the lesson to which the assessment belongs. |
| question | NOT NULL | VARCHAR | NO | The question posed in the assessment. |
| options | NOT NULL | VARCHAR | NO | Possible answer options for the assessment question. |
| correctAnswer | NOT NULL | VARCHAR | NO | The correct answer for the assessment question. |

This table includes assessments associated with lessons. Each assessment has a unique identifier, belongs to a lesson, and contains a question, answer options, and the correct answer.

Table 6
DATA DICTIONARY FOR GRADES

| Fields Name | Constraints | Data Type | Allow Nulls | Description |
|--------------|-------------|-----------|-------------|--|
| gradeId | PK | VARCHAR | NO | Unique identifier of the grade. |
| lesson Id | NOT NULL | VARCHAR | NO | Identifier of the lesson to which the grade belongs. |
| assessmentId | NOT NULL | VARCHAR | NO | Identifier of the assessment related to the grade. |
| score | NOT NULL | INT | NO | Score achieved in the assessment. |
| feedback | NOT NULL | VARCHAR | NO | Feedback provided for the assessment. |

This table records grades for assessments. Each grade has a unique identifier, is linked to a lesson and an assessment, and includes the score and feedback.

Table 7

DATA DICTIONARY FOR FEEDBACK

| Fields Name | Constraints | Data Type | Allow Nulls | Description |
|--------------------|--------------------|------------------|--------------------|--|
| feedbackId | PK | VARCHAR | NO | Unique identifier of the feedback. |
| gradeId | NOT NULL | VARCHAR | NO | Identifier of the grade to which the feedback belongs. |
| teacherId | NOT NULL | VARCHAR | NO | Identifier of the teacher providing the feedback. |
| comments | NOT NULL | VARCHAR | NO | Comments provided by the teacher. |

This table stores feedback provided by teachers for grades. Each feedback entry has a unique identifier, is linked to a grade and a teacher, and includes comments.

Table 8

DATA DICTIONARY FOR COUNTERS

| Fields Name | Constraints | Data Type | Allow Nulls | Description |
|--------------------|--------------------|------------------|--------------------|-----------------------------------|
| counterId | PK | VARCHAR | NO | Unique identifier of the counter. |

| | | | | |
|--------------|----------|---------|----|--|
| studentId | NOT NULL | VARCHAR | NO | Identifier of the student associated with the counter |
| teacherId | NOT NULL | VARCHAR | NO | Identifier of the teacher associated with the counter. |
| counterValue | NOT NULL | INT | NO | Value of the counter. |

This table keeps track of various counters associated with students and teachers. Each counter has a unique identifier, is linked to a student and a teacher, and holds a counter value.

Network Design. Network design involves planning the layout and configuration of a network to facilitate effective communication and resource sharing within an organization or system. This process includes choosing appropriate hardware, establishing network topology, defining IP addressing schemes, and implementing security measures. A well-executed network design ensures the system's reliability, performance, and scalability.

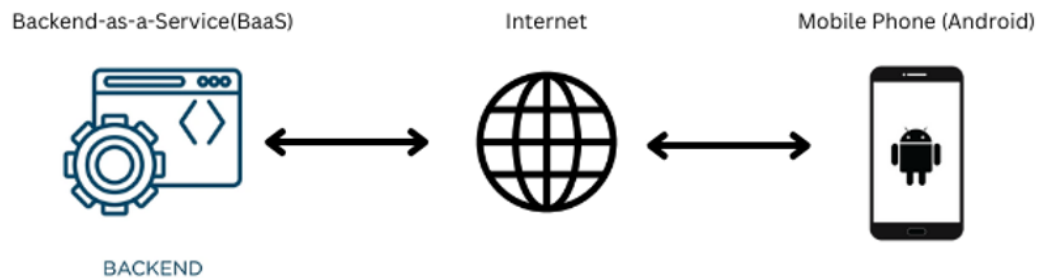


Figure 53: Network Design of Learning ABC's

Network Model. A network model comprehensively depicts the network's architecture, detailing how data is transmitted between devices, how resources are distributed across the network, and how security is managed.

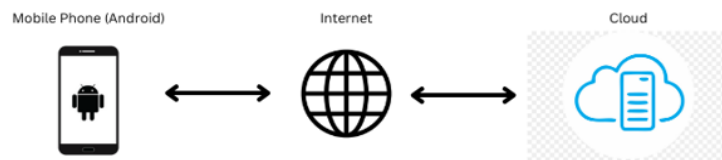


Figure 54: Network Model of Learning ABC's

Network Topology . Network topology refers to the arrangement and layout of elements in a computer network. It defines how different nodes in a network are connected and how they communicate. Network topology can be physical or logical. The physical topology refers to the physical design of the network, including the devices, locations, and cables. The logical topology refers to how data flows within a network, regardless of its physical design.



Figure 55: **Network Topology of Learning ABC's**

Development and Construction/Build Phase

The researchers developed the system utilizing several technologies, including Unity 3D, C#, Kotlin, Java, and Firebase. For the UI layout, the researchers employed Figma and Photoshop.

Technology Stack Diagram . The Technology Stack Diagram shows the combination of programming languages, tools, and frameworks used to create.



Figure 56: Technology Stack Diagram

The figure above illustrates that the system's front end is created using Kotlin. This contemporary programming language operates the Java Virtual Machine (JVM) and supports server-side application development. Developers use Kotlin for its concise syntax, safety features, and compatibility with Java. Java, a well-established programming language and platform, is employed for its portability, scalability, and robustness in building server-side applications. Additionally, Firebase, a Google-developed platform, is utilized for mobile and web application development, offering services such as real-time databases, authentication, cloud storage, and hosting.

Software Specification. The system can be implemented with the following Software Specification:

Table 9
SOFTWARE SPECIFICATION

| LEARNING ABC'S: An Alphabet Learning System for Children | |
|--|---------------------------|
| Back-end: | |
| Database Management System(DBMS) | Firebase |
| Platform Technologies | Android Studio |
| Programming Language | Kotlin, Java |
| Front-end: | |
| Scripting Language | Unity 3D C# |
| UI Environment | Mobile |
| Editors | Prototyping Tools (Figma) |

Hardware specification. The system can be implemented with the following hardware specifications:

Table 10
HARDWARE SPEICIFICATIONS

| | Minimum Requirement | Recommended |
|----------------------------------|---------------------------|-------------------------------------|
| 1. Central Processing Unit (CPU) | Quad-core 1.4 GHz | Octa-core 2.0 GHz or higher |
| 2. System Memory (RAM) | 2 GB | 4 GB or higher |
| 3. Operating System | Android 10 (API level 29) | Android 10 (API level 29) or higher |
| 4. Storage | 8 GB | 16 GB |

Program Specification. The program specifications outline the required processing and data input, along with the functions that the computer program must perform. These specifications detail the program's objectives and the calculations it needs to carry out on the computer.

Functional Requirements:

The system must provide the following functionalities:

- A. Authentication Process** – The system will authenticate the identity of the user trying to access it.
- B. Login Process** – The system allows users to log in with their accounts.

- C. Registration Process** – The system enables users to create a new account.
- D. Student Records** – the system enables the teachers to review the performance overtime that provides a comprehensive log for references and analysis.
- E. Generating Feedbacks** – the system is capable of generating feedbacks of the user's answering the lesson
- F. Database Management** – The system handles information related to Learning ABC's, including details, volunteer data, and organization management.
- G. Account Management** – The system allows both students and teachers to manage accounts, including user registration, login, and password management.

Nonfunctional Requirements. The following are the nonfunctional requirement of the system:

- The system is available 24/7
- The system needs a reliable and active Internet Connection
- The user must have a mobile phone to access the website.
- The user should input their information correctly
- Only registered user can access the website

Human Resources Specification. The research study, Learning ABC'S is focused on the following users:

1. Students
2. Teachers

List of Modules. Below is the tabulated list of modules of Learning ABCs: An Alphabet Learning System for Children.

Table 11
LIST OF MODULES

| Programmer | List of Modules | User | Teacher | Admin |
|---|-----------------------------|------|---------|-------|
| De Castilla, Justin L. | Account Registration | | | |
| | Registration | * | * | |
| | Email Verification | * | * | * |
| No. of point (1 point per module per user) | | 2 | 2 | 1 |
| De Castilla, Justin L. | Account Validation | | | |
| | Login | * | * | * |
| No. of point (1 point per module) | | 1 | 1 | 1 |
| Labajo, Louie Jay | Profile Management | | | |
| | View Details | * | * | |
| | Edit Profile | * | * | |

| | | | | |
|---|--------------------------------|---|---|---|
| | View Progress | * | * | |
| | Send Feedback | * | | |
| | Activate/Deactivate | * | * | * |
| No. of point (1 point per module per user) | | 5 | 4 | 1 |
| Dacoco, Christian Lloyd B. | Notification | | | |
| | Notification | * | * | |
| No. of point (1 point per module) | | 1 | 1 | |
| Dacoco, Christian Lloyd B. | View Progress | | | |
| | Select Profile | * | * | |
| | View Quiz/Assessments results | * | * | |
| | View Lesson Completion | * | * | |
| No. of point (1 point per module) | | 3 | 3 | |
| Dacoco, Christian Lloyd B. | Messaging | | | |
| | View Message | * | * | |
| No. of point (1 point per module) | | 1 | 1 | |
| Cole, Manuel | Activity Management | | | |
| | Activate/Deactivate Exercises | | * | |
| | Activate/Deactivate Assessment | | * | |
| | View Rules & Guidelines | * | * | |
| | View Student Records | | * | |
| | Lesson Creation | | * | |
| | System Update | | | * |
| | Send Messages/Notification | * | * | |
| No. of point (1 point per module per user) | | 1 | 7 | |
| Dacoco, Christian Lloyd B. | Feed Backs | | | |
| | Receive Feed back | | | * |
| | View Feed back | | | * |
| No. of point (1 point per module) | | | | 2 |
| | Manage User | | | |
| | Create User | | | * |

| | | | | |
|--------------------------------------|------------------------|---|---|---|
| Sali, Amir Alden | View User | | | * |
| | Edit User | | | * |
| | Delete User | | | * |
| | Confirm Organization | | | * |
| No. of point (1 point per module) | | | | 5 |
| Cole, Manuel | Lesson Creation | | | |
| | View Lesson | * | * | * |
| | Activate lesson | | * | |
| No. of point (1 point per module) | | 1 | 2 | 1 |

Testing Plan. The table below highlights that the Testing Phase of the Learning ABC's system is crucial for evaluating software security, functionality, and robustness. This phase examines the module's clarity and components to ensure they perform optimally and maintain reliability.

Unit Testing. The table below is a test case matrix employed in software testing to record detailed information about different test cases for the system's modules. Each row in the matrix corresponds to a specific test case, outlining the module and unit under test, the test case identifier, description, expected and actual results, and any comments. This matrix is essential for methodically verifying that each system component as intended under various scenarios, ensuring thorough testing coverage and effective tracking of the testing process.

Table 12
UNIT TESTING

| Module Name | Unit Name | Date Tested | Test Case ID | Test Case Description | Expected Results | Remark |
|--------------|-----------|-------------|--------------|-----------------------|---------------------------------------|--------|
| Registration | Sign up | | TC-001 | Valid Entries | Registration Successful | |
| Registration | Sign up | | TC-002 | Invalid Entries | Account will not proceed to the login | |

| | | | | | | |
|----------------------------|--------------------|--|--------|--|----------------------------------|--|
| Login | Log in As | | TC-003 | Select User to log in | Proceed to Log in | |
| Login | Login | | TC-004 | Valid Entries | Log in Successful | |
| Login | Login | | TC-005 | Invalid Entries | Cannot proceed to the main page | |
| Forgot Password | Email | | TC-006 | Enter registered email | Proceed to Gmail in get the code | |
| Forgot Password | Email | | TC-007 | Invalid Email | Cannot open and get the code | |
| Account Settings | Change Account | | TC-008 | Change Account | Account successfully change | |
| Account Settings | Change Account | | TC-009 | The user are able to manage the sounds | Successfully turn on/off | |
| Account Settings | Sign out | | TC-010 | User Sign out | User successfully sign out | |
| Teacher Student Assessment | Student Assessment | | TC-011 | Select student to participate the assessment | Successfully Activate | |

| | | | | | | |
|---------------------------------|----------------------|--|------------|---|---|--|
| Teacher Student Record | Student Record | | TC- 012 | Teacher are able to view and press the student | Scoreboard will show | |
| View Student Progress | Student Progress | | TC- 013 | Teacher can press three selection progress | Successfully view the student progress | |
| Teacher Student Exercises | Student Exercises | | TC- 014 | Activate Student Exercises | Successfully Activate | |
| Teacher Notification | Notification | | TC- 015 | Student Send messages and admin for current updates | Notification will show | |
| Student Learning Contents | Learning Contents | | TC- 016 | Students are able to select Contents | It will proceed to assessment and play | |
| Student Assessment | Color Guess | | TC- 017 | Student must choose the correct color | It will proceed to the next level | |
| Student Assessment | Color Guess | | TC- 018 | Wrong press the color | The game will be over, and the score will show | |
| Student Assessment | Count & Play | | TC- 019 | Student must count correctly according to the images display | The game will proceed to the next level | |

| | | | | | | |
|----------------------------|--------------------|--|--------|---|---|--|
| Student Assessment | Count & Play | | TC-020 | Miss the count | The game will be over, and the score will show | |
| Student Assessment | ABC's Learning | | TC-021 | Pronounce the alphabet correctly | Will move to the next alphabet | |
| Student Assessment | ABC's Learning | | TC-022 | Pronounce the alphabet correctly | Student will received ratings | |
| Student Assessment | ABC's Learning | | TC-023 | Wrong pronunciation | Will receive poor ratings | |
| Student Exercises | Student Exercises | | TC-024 | Participate every Exercises | Receive feedback coming from teacher | |
| Student rules & Guidelines | Rules & Guidelines | | TC-025 | Students will the how to play button | Rules & Guidelines will show | |
| Students Notification | Notification | | TC-026 | Send Request to Activate the assessment | The teacher will a notification | |
| Student Notifications | Notifications | | TC-027 | Teacher and admin notify student | Student will receive notifications from teacher & admin | |

| | | | | | | |
|----------------------------|---------------------------|--|------------|---|---|--|
| Admin Manage Account | Manage User Account | | TC- 028 | Admin press the user manager button | Successfully view the user Account | |
| Admin Manage Account | Manage User Account | | TC- 029 | Admin press the delete button | Successfully delete account user | |
| System Update | System Update | | TC- 030 | Admin press the Update button | Successfully Update the system | |
| Admin Notification | Notification | | TC- 031 | Admin press the notify button | Both user Student & Teacher will receive notification | |

Integration Testing. The table below represents an integration test case matrix used to document the specifics of various integration test cases for different system modules. Each row details a particular integration test case, including the modules involved, the integration processes, pre-conditions, expected outcomes, actual results, and additional comments. This matrix is vital for verifying that the different components of the system interact smoothly and function cohesively.

Table 13

INTEGRATION TESTING

| Test Case ID | Module 1 | Integration Process | Module 2 | Pre-condition | Result | Remarks |
|--------------------|----------------|---|---|---|---------------|---------|
| IntegTest Case-001 | Login Process | Verify successful integration when registering a new user | Register Process | User is not registered in and inputs correct information | To be perform | |
| IntegTest Case-002 | Login Process | Test integration when user logs in as Admin | Manage Users, Manage Subscriptions | Admin inputs correct credentials and logs in successfully | To be perform | |
| IntegTest Case-003 | Login Process | Test integration when user logs in as Teacher | Manage Lesson, Manage Exercise, Assessment Review | Teacher inputs correct credentials and logs in successfully | To be perform | |
| IntegTest Case-004 | Login Process | Test integration when user logs in as Student | Lesson Access, Exercise Participation, Assessment Viewing | Student inputs correct credentials and logs in successfully | To be perform | |
| IntegTest Case-005 | Manage Account | View Profile | Change account to login | User is logged in | To be perform | |

| | | | | | | |
|--------------------|-----------------------------|--|------------------------------|--|---------------|--|
| IntegTest Case-006 | Teacher Students Assessment | Select Students to Activate the Assessment | Activate Students Assessment | Teacher selects students | To be perform | |
| IntegTest Case-007 | Teacher Student Record | View Student Record | View Scoreboard | Must have record play both assessment and Exercises | To be perform | |
| IntegTest Case-008 | Teacher Students Progress | View all Progress | View progress | Must have entries | To be perform | |
| IntegTest Case-009 | Teacher Student Exercise | Select Exercises to activate | Activate Exercises | Teacher needs to select student to activate the assessment | To be perform | |
| IntegTest Case-010 | Students Learning Contents | Select Contents to play | Play Assessments | Student selects content to play | To be perform | |
| IntegTest Case-011 | Students Learning Contents | Select Contents to play | Participate in Exercises | Student selects content to play | To be perform | |
| IntegTest Case-012 | Students Learning Contents | Select Contents to play | Voice Recognition Exercise | Student selects content to play | To be perform | |

| | | | | | | |
|-----------------------|----------------------------------|-------------------------------|----------------|---|------------------------|--|
| IntegTest Case-013 | Students Learning Contents | Select Contents to play | Color Game | Student selects the color game to play | To be perform ed | |
| IntegTest Case-014 | Students Learning Contents | Select Contents to play | Number Game | Student selects the number game to play | To be perform ed | |

Alpha Testing. The table below represents an integration test case matrix used to document the specifics of various integration test cases for different system modules. Each row details a particular integration test case, including the modules involved, the integration processes, pre-conditions, expected outcomes, actual results, and additional comments. This matrix is vital for verifying that the different components of the system interact smoothly and function cohesively.

Table 14
ALPHA TESTING

| Test Criteria | Poor | Fair | Good | Very Good |
|---|------|------|------|-----------|
| GRAPHICAL USER INTERFACE (GUI) | | | | |
| Consistency (The interface maintains a uniform style and icons throughout the system) | | | | |
| Reusability (The system includes reusable components like familiar buttons, text fields, check boxes, etc.) | | | | |
| Forgiveness and Tolerance (The interface provides messages or prompts allowing users to undo or redo critical actions) | | | | |
| Simplicity (The GUI design features simple, clear buttons and screens with an uncluttered message) | | | | |
| Readability (The interface uses appropriate colors, font sizes, and styles suitable for both instructors and students) | | | | |
| Clarity (Error, help, and warning messages are clear, concise, | | | | |

| | | | | |
|---|--|--|--|--|
| and easy to understand) | | | | |
| User-friendliness (The GUI is user-friendly, offering helpful, polite, and non-offensive messages) | | | | |
| SYSTEM PERFORMANCE | | | | |
| Conformance to Requirements (The system meets all specified features and requirements) | | | | |
| Conformance to Objectives (The system fulfills all specified objectives) | | | | |
| Efficiency (The system operates efficiently with no delays in transactions) | | | | |
| Security (Login details are authenticated, and input parameters are verified before proceeding) | | | | |
| Integrity (The system allows registered users to control their private information) | | | | |
| Overall Impression (Overall, the system is functional and practical) | | | | |

Acceptance Testing. In the acceptance testing phase for "Learning ABC's: An Alphabet Learning System for Children," the system is rigorously evaluated to confirm that it meets all specified requirements and is prepared for deployment. The assessment focuses on criteria such as functionality, robustness, and overall user experience. Each attribute is rated on a scale from "Poor" to "Excellent," with room for comments to ensure a thorough review of the system's readiness for launch. This detailed evaluation process ensures that "Learning ABC's" delivers a seamless, reliable, and user-friendly experience, effectively supporting children's learning.

Table 15
ACCEPTANCE TESTING

| | Please check only for each attribute | | | | | |
|---|--------------------------------------|------|------|-----------|-----------|---------|
| Attribute being evaluated | Poor | Fair | Good | Very Good | Excellent | Comment |
| Functionality: Does the system fulfill all the functions specified by the objectives? | | | | | | |
| Robustness: Can the system run continuously without errors or needing adjustments? | | | | | | |
| Overall: Does the interface display messages or prompts allowing users to undo or redo critical actions? | | | | | | |

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CURRICULUM VITAE

MANUEL C. COLE JR.

colemanuel5@gmail.com

| | |
|----------------|---------------|
| Age | 23 |
| Gender | Male |
| Date of Birth | June 29, 2001 |
| Place of Birth | Mandaue City |
| Civil Status | Single |
| Nationality | Filipino |



Educational Background

| | |
|--------------------|---|
| Tertiary Education | Bachelor of Science in Information Technology University of Cebu Lapu – Lapu and Mandaue |
| Senior High School | STI Cebu |
| Junior High School | San Isidro Parish School |
| Elementary School | Mandaue City Central School |

Skills

- Programming (SQL, C#, JAVA, HTML, CSS, Python, JavaScript, MySql)
- Microsoft Office (MS Word, Excel, PowerPoint)

Certificates & Seminars

- Database Programming Tutorial using PHP Seminar-Workshop

CHRISTIAN LLOYD B. DACOCO

christiandacoco08@gmail.com

| | |
|----------------|---------------------|
| Age | 23 |
| Gender | Male |
| Date of Birth | June 08, 2001 |
| Place of Birth | OponMaternity House |
| Civil Status | Daybors |
| Nationality | Filipino |

**Educational Background**

| | |
|--------------------|---|
| Tertiary Education | Bachelor of Science in Information Technology University of Cebu Lapu – Lapu and Mandaue |
| Senior High School | University of Cebu Lapu - Lapu and Mandaue |
| Junior High School | Saint Dominic Savio International School |
| Elementary School | Saint Dominic Savio International School |

Skills

- Programming (SQL, C#, JAVA, HTML, CSS, Python, JavaScript, MySql)
- Microsoft Office (MS Word, Excel, PowerPoint)

Certificates & Seminars

- CSS NCII Holder

JUSTIN L. DE CASTILLA

longakitjustin@gmail.com

| | | |
|----------------|----------------|------|
| Age | 23 | |
| Gender | Male | |
| Date of Birth | March 04, 2001 | |
| Place of Birth | Cebu | City |
| Civil Status | Single | |
| Nationality | Filipino | |

**Educational Background**

| | |
|--------------------|---|
| Tertiary Education | Bachelor of Science in Information Technology University of Cebu Lapu – Lapu and Mandaue |
| Senior High School | Divine Life Institute of Cebu Inc. |
| Junior High School | Arcelo Memorial National High School |
| Elementary School | Holy Trinity Child Development School |

Skills

- Programming (SQL, C#, JAVA, HTML, CSS, Python, JavaScript, MySql)
- Microsoft Office (MS Word, Excel, PowerPoint)

Certificates & Seminars

- Database Programming Tutorial using PHP Seminar-Workshop

LOUIE JAY P. LABAJO

louie.ljl@gmail.com

| | |
|----------------|----------------|
| Age | 23 |
| Gender | Male |
| Date of Birth | May 21, 2001 |
| Place of Birth | Lapu-Lapu City |
| Civil Status | Single |
| Nationality | Filipino |

**Educational Background**

| | |
|--------------------|---|
| Tertiary Education | Bachelor of Science in Information Technology University of Cebu Lapu – Lapu and Mandaue |
| Senior High School | University of Cebu Lapu - Lapu and Mandaue |
| Junior High School | Advance Institute of Technology Inc. |
| Elementary School | Advance Institute of Technology Inc. |

Skills

- Programming (SQL, C#, JAVA, HTML, CSS, Python, JavaScript, MySql)
- Microsoft Office (MS Word, Excel, PowerPoint)

Certificates & Seminars

- Database Programming Tutorial using PHP Seminar-Workshop

AMIR ALDEN F. SALI

mikosali90@gmail.com

| | |
|----------------|------------------|
| Age | 23 |
| Gender | Male |
| Date of Birth | January 23, 2001 |
| Place of Birth | Pagadian City |
| Civil Status | Single |
| Nationality | Filipino |

**Educational Background**

| | |
|--------------------|---|
| Tertiary Education | Bachelor of Science in Information Technology University of Cebu Lapu – Lapu and Mandaue |
| Senior High School | Saint Dominic Savio International School |
| Junior High School | Saint Dominic Savio International School |
| Elementary School | Lapu-Lapu City Central Elementary School |

Skills

- Programming (SQL, C#, JAVA, HTML, CSS, Python, JavaScript, MySql)
- Microsoft Office (MS Word, Excel, PowerPoint)

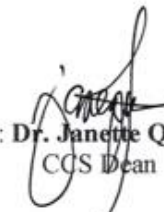
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APPENDIX A
TRANSMITTAL LETTER

June 5, 2024

DR. JOVITA B. AUGUSTO
SAINT DOMINIC SAVIO INTERNATIONAL SCHOOL
Sangi New Road, Pajo, Lapu-Lapu City, 6015, Cebu

THRU:  **Dr. Janette Q. Tanquis**
CCS Dean


Dear Dr. Augusto,

We are writing to inform you about our upcoming research project titled "**Learning ABC's: An Alphabet Learning System for Children.**" This study is being undertaken as part of the requirements for our Bachelor of Science in Information Technology degree. We kindly request your permission to carry out this research at the Saint Dominic Savio International School. The objective of our research is to assess the effectiveness of a new system designed to teach the alphabet to young children. To achieve this, we plan to collect data through a thoughtfully designed survey, which will be distributed to faculty members specializing in primary education. We assure you that all information gathered will be treated with utmost confidentiality and used solely for research purposes, adhering to ethical standards.

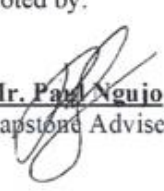
We appreciate your time and consideration and hope for a favorable response that will greatly aid in the success of our academic endeavor.

Thank you,

Sincerely,


Louie Jay P. Labajo
Project Manager

Noted by:

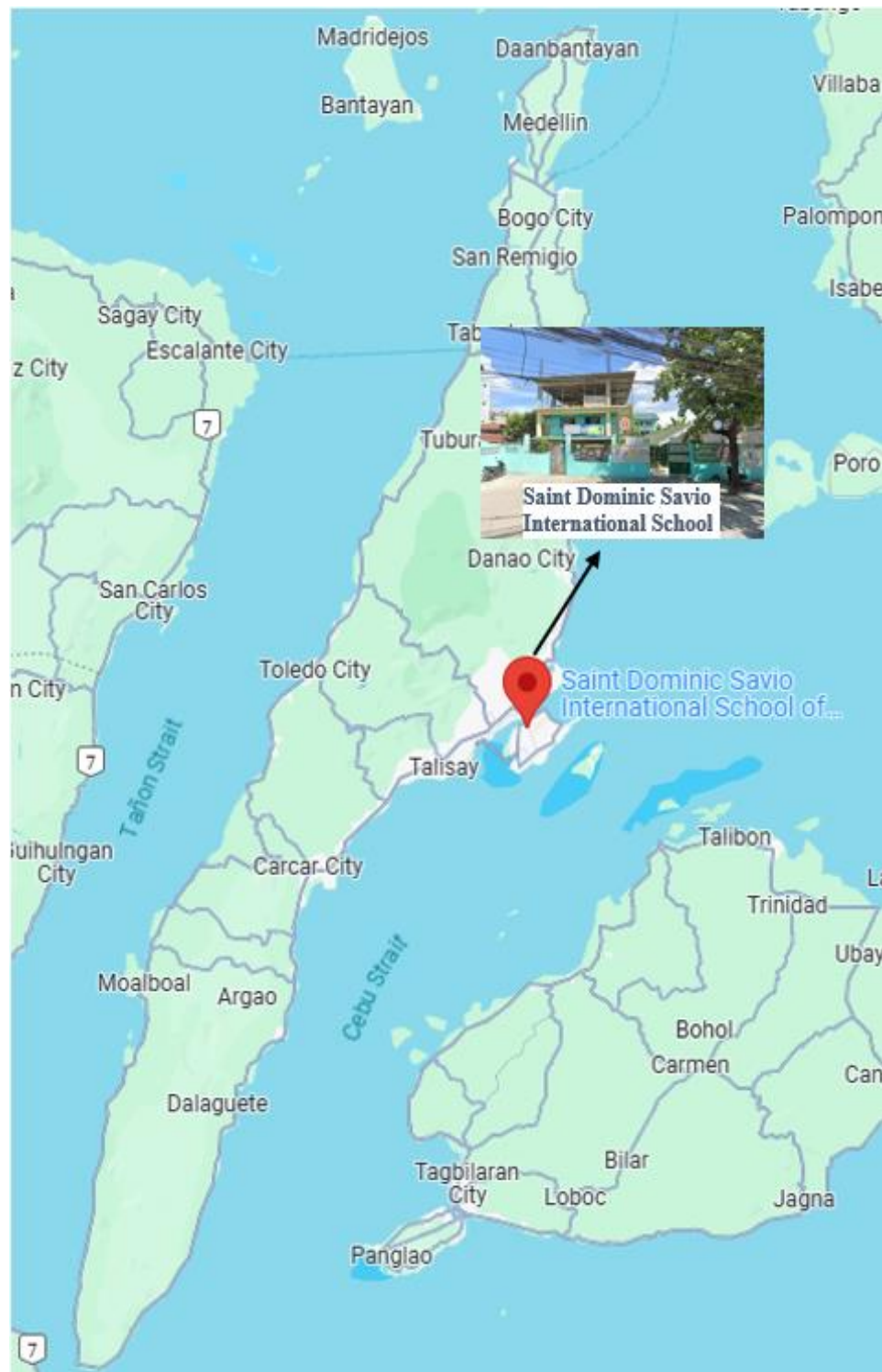

Mr. Paul Ngujo
Capstone Adviser

Approved by:


Dr. Jovita B. Augusto
Saint Dominic Savio International School Principal

APPENDIX B

Map of the Research Environment



APPENDIX C

Survey Questionnaires

Dear Respondents,

We sincerely urge you to take part in a survey that aims to learn more about the present user attitude and anticipated levels of satisfaction with relation to using the ABC's Learning System. This platform is designed to enhance the Alphabet pronunciation skills and basic learning of the students.

This would include any area where you routinely interact with others, such as in school.

The following questionnaire should take 5 – 10 minutes to complete.

Your responses are **STRICTLY CONFIDENTIAL AND ANONYMOUS**.

- The surveys will only be accessible to the Research team.
- The report will not contain any naming of individuals. Instead, it will just display the findings' statistical summaries.

Your contribution to insight is precious.

Thank you for taking the time with us.

Sincerely,

The Research Team

Cole, Manuel Jr. C.

Dacoco, Christian Lloyd B.

De Castilla, Justin L.

Labajo, Louie Jay P.

Sali, Amir Alden F.

Section A: Demographic Information

Direction: Kindly indicate your answers by choosing the choices below.

Gender:

- ☐ Male
- ☐ Female

Choose 1 below:

- ☐ Teacher
- ☐ Parent

Age:

- ☐ 25 to 27
- ☐ 28 to 30
- ☐ 31 Above

Years of Teaching (for Teacher):

- ☐ Less than 1 year
- ☐ 1-3 years
- ☐ 4-6 years
- ☐ More than 7 years

Do you have previous experience with a Learning Application?

- ☐ Yes
- ☐ No

Are students having difficulties on learning pre-education knowledge?

- ☐ Yes
- ☐ No

Do students with no pre-education knowledge have a hard time learning new lessons?

- ☐ Yes
- ☐ No

Do learning applications have a big impact on students/children?

- ☐ Yes
- ☐ No

Section B: User Needs and Trends

Directions: Kindly mark(✓) the column are corresponding to each statement to indicate your honest sentiment towards them using the following scale:

| Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|-----------------------|--------------|----------------|-----------------|--------------------------|
| SA | A | N | D | SD |

| User Needs and Trends | SA | A | N | D | SD |
|---|-----------|----------|----------|----------|-----------|
| 1. To what extent do you agree or disagree with the statement: Ready-made content helps children avoid inappropriate content? | | | | | |
| 2. How strongly do you agree or disagree on the learning system that teaches children basic alphabet and nursery knowledge? | | | | | |
| 3. Voice recognition may be able to help improve a child's pronunciation. | | | | | |
| 4. Do you believe that a simple and child-friendly system is effective in helping children learn basic nursery knowledge? | | | | | |
| 5. Do children need to be effectively guided through the letters in sequence? | | | | | |

Section C: Potential Features

Directions: Kindly mark (✓) the column area corresponding to each statement to indicate your honest sentiment towards them using the following scale:

| Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|-----------------------|--------------|----------------|-----------------|--------------------------|
| SA | A | N | D | SD |

| Potential Features | SA | A | N | D | SD |
|--|-----------|----------|----------|----------|-----------|
| 1. Would a tracking system that allows teachers to monitor students' progress be beneficial? | | | | | |
| 2. Does accessible learning content effectively prevent exposure to inappropriate and dangerous topics? | | | | | |
| 3. Does simple quizzes are effective in measuring children's understanding? | | | | | |
| 4. To what extent do you believe interactive activities aid children in recognizing and remembering course material? | | | | | |
| 5. Assignments play a crucial role in ensuring continuous learning for children. | | | | | |

Section D: User Barriers and Challenges

Directions: Kindly mark (✓) the column area corresponding to each statement to indicate your honest sentiment towards them using the following scale:

| Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|-----------------------|--------------|----------------|-----------------|--------------------------|
| SA | A | N | D | SD |

| User Barriers and Challenges | SA | A | N | D | SD |
|---|-----------|----------|----------|----------|-----------|
| 1. Compelling a child to use a learning method that does not align with their preferred learning style. | | | | | |
| 2. Excessive gadget use can harm children's health | | | | | |
| 3. Forcing lessons on children when they are not interested is counterproductive. | | | | | |
| 4. Repetitive content leads to limited engagement from children. | | | | | |
| 5. There is insufficient support for children with special learning needs or disabilities. | | | | | |
| 6. Frustration occurs when the system's difficulty does not match the child's abilities. | | | | | |

Section E: Respondents' Recommendation

Directions: What suggestions do you have for improving the future Learning ABC's System, especially to the children who has having hard time pronouncing the alphabet? If non just indicate N/A:
