MY LITTLE LEARNER: E-LEARNING WONDERLAND

BY

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I declare that this report entitled "MY LITTLE LEARNER: E-LEARNING WONDERLAND" is my work except as cited in the references. The report has not been accepted for any degree and is not being submitted concurrently in candidature for any degree or other award.

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ABSTRACT

This project focuses on creating a complete kindergarten e-learning application called "My Little Learner: E-Learning Wonderland", intended to improve early childhood education using digital methods. The main goal is to overcome the shortcomings that currently exist in e-learning platforms for young learners, including inadequate motivation incentives, a lack of a dashboard that provides insight, an absence of a reminder notification system, insufficient support for a variety of learning methods, and a lack of interactive areas. A range of instructional materials catered to the requirements and learning preferences of children in kindergarten will be available on the app. The emphasis will be on providing an exciting and inspiring experience through interactive games, storytelling, and multimedia activities. The app will also use adaptive learning algorithms to tailor the instructional material to each child's unique learning style and speed. Creating an analytic dashboard, which offers information on the child's learning, is a crucial component of the project. This feature will make it easier for kindergarten kids and parents to monitor the learning progress and identify areas for improvement, which will improve the learning process overall. The project will use cutting-edge programming technologies, including Flutter (Dart), Firebase, and Visual Studio Code, to produce an interactive, user-friendly, and flexible learning app that supports various devices. In summary, the project seeks to develop e-learning software for kindergarten that is not only advanced in terms of technology but also sound in terms of education and designed with the unique requirements of young learners in mind. A fully working e-learning app with various instructional activities and extensive support resources to assist teachers and kindergarten children is an anticipated outcome.

Area of Study (Minimum 1 Maximum 2): Mobile Application Development, Educational Technology

Keywords (Minimum 5 Maximum 10): Kindergarten E-Learning, Mobile Learning Application, Adaptive Learning, Gamified Education, Early Childhood Education

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Chapter 1
Introduction

In today's ever-changing digital world, the merger of technology and education has become essential for influencing young learners' learning experiences. My Little Learner: E-Learning Wonderland is at the vanguard of this movement, attempting to revolutionise kindergarten education by creating an innovative kindergarten e-learning application.

This effort sprang from an in-depth understanding of the issues inherent in traditional educational systems and tried to overcome them using technology. This project intends to build an exciting and engaging e-learning environment that surpasses the restrictions of conventional approaches to education to adapt precisely to the unique requirements of kindergarten-aged children.

Through investigation of personalised learning, parental participation, and the incorporation of innovative technology, this project seeks to transform how young learners, especially kindergarten children, interact with learning resources. The project seeks a personalised educational journey that stimulates curiosity, engagement, and academic progress through a precise combination of interactive components, adaptive learning algorithms, social interaction space, and detailed dashboards.

Furthermore, My Little Learner: E-Learning Wonderland intends to improve kindergarten children's educational experiences and bridge the gap between home and school environments. The programme aims to establish a collaborative academic environment that fosters holistic development by providing parents with tools to actively engage in their child's learning journey.

In brief, a project will be launched to change the future of kindergarten children's education. It will be a project driven by innovation, individualised experiences, and a commitment to preparing kindergarten children for success in a world that is becoming increasingly digital.

1.1 Background Information

Over the years, there have been significant changes to the early childhood education environment due to technological developments and improved awareness about how young children learn. Kindergarten education traditionally strongly emphasises involving young students through experiential learning, direct teacher-student interaction, and physical classrooms. However, as digital technologies become increasingly engaged in daily life, there has been a trend in education toward using e-learning systems to support and improve traditional teaching strategies. The trend is undeniable in early childhood education, where individualised, dynamic, and engaging learning experiences are essential.

"My Little Learner: E-Learning Wonderland" is a modern e-learning platform created especially for kids in kindergarten. Through the establishment of a broad, dynamic, and attractive digital learning environment, this project addresses the gap between standard early childhood education and modern digital learning. The platform is more than just a collection of online courses; it's an entirely immersive learning environment that blends the convenience and adaptability of online learning with the best elements of conventional education.

In the past, e-learning platforms were mainly created for senior students and adults, with material or interfaces that frequently failed to meet the unique requirements of young children. The delivery of educational material must be fundamentally reconsidered, given the introduction of online education tools for kindergarten children. Younger children learn differently from adults; they are happier to connect with and become engaged with visually stimulating, rewarding content. To keep kids interested and motivated, "My Little Learner: E-Learning Wonderland" recognises this and incorporates various interactive features like games, animated stories, and a reward system.

The concept of adaptive learning is critical to understanding the importance of this project, which customises educational content to each child's individual learning preferences and styles. Adaptive learning technologies are being implemented in e-learning platforms at an increasing rate throughout all academic levels. Within the kindergarten setting, this method guarantees that every child may learn at their speed, obtain specific guidance, and meet learning objectives that match their skills and abilities. This is an essential shift from the general approach that has previously characterised early childhood education.

In summary, "My Little Learner: E-Learning Wonderland" signifies a significant advance in early childhood education by fusing cutting-edge digital learning tools with tried-and-true educational methods. It establishes foundations for further advancements in kindergarten e-learning and a new benchmark for using digital technologies to improve young children's educational experiences.

1.2 Problem Statement

Based on the review of the previous kindergarten e-learning application and related research paper, it has been found that current kindergarten e-learning platforms face several critical limitations that limit their effectiveness in promoting childhood education.

1.2.1 Lack of Self-Motivation in Children

One of the most significant challenges in kindergarten e-learning is a lack of self-motivation among children, as traditional e-learning approaches often fail to engage young learners, leading to boredom and reduced interest in learning [1]. Working towards any goal demands dedication and drive, and learning online appears to be packed with the potential to lose these characteristics [2]. Young children are born curious and lively, with a strong desire to play and explore. This, however, implies kids have shorter attention spans and are more quickly bored, particularly with activities that lack a hands-on or participatory component [3]. Traditional e-learning programmes sometimes fail to adapt to these features, providing information that is not sufficiently engaging or dynamic to maintain a child's attention over time. E-learning may become a boring experience for children if it lacks aspects that promote curiosity and interest, such as games, music, and interactive activities, leading to decreased motivation. The lack of a prize system that establishes a purpose for children to continue studying may decrease kindergarteners' motivation. When children are not engaged, instructional information fails to have an impact, resulting in poor learning results. This is especially true in e-learning contexts, where physical instructor presence and peer contact, which may frequently stimulate learning, are lacking.

1.2.2 Lack of a Dashboard for Insight

Within existing kindergarten e-learning systems, the lack of a complete dashboard that gives insights into a child's learning progress is a crucial limitation, preventing effective monitoring and support of a child's educational growth. This limitation limits instructors' and parents' capacity to properly monitor and assist the learning development of young learners [4]. A dashboard is critical in supporting personalised education. It allows tracking a child's learning path and identifying strengths and areas for development. Instructors and parents cannot efficiently monitor a child's progress and discover learning trends without a dashboard. Such insights are critical for understanding how kids engage with educational material and which areas they find difficult. The learning experience becomes less personalised and potentially less successful without a dashboard. To improve the academic experience, intelligent dashboards must be included in kindergarten e-learning systems. These dashboards enable personalised education, enhanced interaction between parents and educators, and, ultimately, more successful learning outcomes by offering specific insights into a child's learning progress.

1.2.3 Lack of a Notification as a Reminder

The lack of a reminder notification mechanism in e-learning platforms considerably interrupts kindergarten children's consistent study patterns. The lack of frequent notifications increases the likelihood of missed educational sessions, resulting in irregular educational activities, particularly for individuals studying at home. This lack of reminder notification directly influences the children's learning habits and engagement, potentially leading to educational gaps. Without timely reminders, learners may ignore or forget scheduled activities, affecting their academic path and negatively damaging their overall engagement within the e-learning platform [5][6]. Integrating a notification system inside these platforms is critical for maintaining a structured learning environment that encourages continual engagement and interaction from young learners.

1.2.4 Inadequate Support for Diverse Learning Styles

Inadequate support for children's different learning styles is a clear issue in many e-learning apps. Children have a variety of learning methods, including visual, auditory, and kinesthetic

learning. An e-learning platform must use visual and interactive elements, for example, music, vivid visuals, and engaging animations, to create a fun experience for kids [7]. Many e-learning apps, on the other hand, focus only on one form of material delivery, ignoring the range of learning preferences among young learners [8][9]. This strategy ignores young learners' different learning requirements and preferences, limiting the platforms' inclusion and efficacy. The inability to accommodate different learning styles is a crucial barrier to delivering a well-rounded and exciting learning experience for all children who use these applications.

1.2.5 Absence of Social Interaction Spaces

The current generation of kindergarten e-learning apps sometimes lacks specific spaces that mimic the critical social dynamics of physical classrooms, such as discussion forums or interactive rooms. While these platforms excel at providing educational information, the lack of social interaction spaces limits young learners' ability to engage in collaborative learning experiences. The lack of social interaction spaces significantly hinders holistic learning and development. Peer-to-peer interactions, conversations, and group activities are widely used in early childhood education to promote social skills, communication abilities, and collaborative learning. The lack of these interactive places in e-learning settings hinders the platform's ability to deliver an all-encompassing educational experience. To overcome this gap, kindergarten e-learning platforms must be reconstructed to provide instructional material and develop a feeling of community and social engagement. Including socialised interaction places for conversations, collaborative activities, and peer-to-peer involvement within these digital platforms is critical for supplementing the learning process and facilitating a more comprehensive approach to kindergarten education [10].

1.3 Motivation

The motivation for creating a kindergarten e-learning app derives from a desire to reinvent childhood education by implementing modern digital tools. As the world develops, technology becomes an increasingly important element of daily life, necessitating its seamless incorporation into learning environments, particularly for kindergarten children. The project is motivated by creating an e-learning environment that promotes learning and aligns with kindergarten kids' developmental requirements and various learning styles.

Existing educational platforms frequently fail to captivate children's minds or accommodate their learning styles and preferences. The proposed kindergarten e-learning app seeks to satisfy this need by providing an interactive platform customised to the diverse requirements of young children, assuring a personalised learning experience for all learners. The application will develop a dynamic and engaging learning space by merging sophisticated learning technologies such as adaptive algorithms and interactive multimedia material to improve learning results and instil an intense interest in education among kindergarten children.

Parental engagement is critical in early childhood education. This app will empower parents by enabling active engagement in their child's educational path. The app will provide parents with resources to properly guide and assist their children's learning experiences, incorporating a dashboard that allows progress monitoring.

This application intends to address common issues in kindergarten education, such as maintaining regular learning routines, enabling varied learning styles, and ensuring robust engagement and motivation. By addressing these concerns, this project intends to make e-learning a more realistic and successful choice for early childhood education.

Fostering technology literacy at a young age becomes critical in a society increasingly reliant on digital skills. The planned e-learning software is a first step towards educating students for a future in which digital fluency will be essential. In summary, this project aims to design an e-learning software that improves kindergarten children's educational journey and creates a solid foundation for their future learning and growth.

1.4 Project Scope and Direction

The project aims to deliver a comprehensive kindergarten e-learning application designed to solve current issues in early childhood education. By the end of the project, it aims to provide a fully functional kindergarten e-learning platform with interactive elements, a reminder notification system, adaptive learning algorithms, a comprehensive dashboard, and a collaborative discussion space to create an engaging, personalised, and inclusive digital learning environment for young children. First, the kindergarten e-learning programme will **include various interactive components** such as games, animated material, narrative, and a reward system. These features will be purposefully developed to captivate young learners,

foster their curiosity, and maintain their interest throughout their journey. The goal is to create an immersive and enjoyable learning environment that captures the attention of youngsters while delivering instructional knowledge. A reward system will be implemented to incentivise and reward children's growth and achievements on the site. Children learn best when directed by a defined objective [4]. This feature seeks to incentivise beneficial learning habits by defining manageable milestones and delivering virtual incentives or badges. The prizes will acknowledge a child's achievements, strengthening their sense of success and promoting continuing engagement and effort.

Second, the application will offer **a complete dashboard** for instructors and parents. This dashboard will give extensive insights into a child's learning path, emphasising strengths, areas for growth, and learning patterns. Educators and parents will have real-time progress tracking, allowing them to make educated decisions and implement targeted support methods for a personalised educational experience for each child.

Third, a **reminder notification system in calendar view** will be implemented to maintain regular learning routines and increase parental participation. Through push notifications, users will receive timely information regarding scheduled learning sessions, fresh content, or instructional activities [5]. These alerts will be critical in maintaining a scheduled learning regimen and keeping parents informed and active in their child's educational development [6].

Fourth, the kindergarten e-learning software will **include a variety of teaching techniques and information** to cater to young children's different learning styles. This includes interactive games, storytelling, audiovisual features, and hands-on activities, making learning more inclusive and prosperous, regardless of any preferred learning style.

Finally, within the e-learning environment, the kindergarten e-learning software will have **an interactive room**. These environments will mimic the dynamics of traditional classrooms, encouraging collaborative interactions, collaborative activities, and group conversations. Given kindergarten children's abilities, the communication method will primarily focus on voice to provide simplicity and accessibility for young learners. Beyond giving educational material, the goal is to foster community and social interaction among young learners. The initiative aspires to expand the academic experience and create a more complete environment for learning for kindergarten-aged children by rethinking the platform to incorporate these social interaction areas.

The project scope includes creating a fully functional kindergarten e-learning application with interactive components, a prize system, extensive dashboards, robust notifications, adaptive learning algorithms, and a collaborative discussion room. This complete system seeks to revolutionise early childhood education by providing young learners with an engaging, personalised, and inclusive digital learning environment.

1.5 Objectives

The fundamental goal of this project is to create a comprehensive kindergarten e-learning platform that successfully addresses issues in early childhood education in this digital age. This project is designed with a deep understanding of the unique demands and restrictions that young children experience in digital learning, aiming to provide an engaging and inclusive learning environment for young learners.

The first objective of this project is **to develop an engaging e-learning environment that seamlessly integrates entertainment and education by incorporating interactive elements and a reward system** to increase children's motivation and engagement, encourage their active participation, and foster a positive attitude towards learning. It employs interactive components such as games, animated material, storytelling, and fun elements to generate curiosity and sustain high user interest. There will also be a prize system to encourage and reward children's development and successes, developing healthy learning attitudes by offering concrete acknowledgement for their efforts. This element fosters a sense of success and growth by utilising attainable milestones and virtual awards or badges, which align with children's intrinsic drive for acknowledgement and accomplishment. As a result, it promotes active engagement and instils a positive attitude.

Aside from that, the project intends **to integrate a complete dashboard** into the kindergarten e-learning platform, providing educators and parents with a complete perspective on a child's learning journey. Recognising the critical role of parents in early education, the dashboard provides insights into their kids' activities, accomplishments, learning patterns, and areas that require attention and improvement, allowing them to track and encourage their learning growth. This promotes a collaborative educational environment by increasing parental engagement and informed decision-making to personalise education, ensuring every child is provided with tailored support techniques, resulting in improved learning results.

Besides that, the project goal is **to integrate a calendar notification system as a reminder** into kindergarten e-learning platforms, enabling users to view, manage, and be reminded of scheduled activities in a calendar format. This solution seeks to maintain a disciplined learning routine by providing timely notice for planned learning sessions, changes, or new information, thereby addressing the issue of disrupted study patterns. The notification system will also boost children's motivation, helping them stay engaged and committed to their educational journey.

In addition, the goal is **to incorporate different teaching techniques and materials to enable different learning styles.** To accommodate a broader range of learning styles, interactive games, narrative, audiovisual components, and hands-on activities should be used [8]. The initiative attempts to provide a more inclusive and prosperous learning experience by integrating these techniques, ensuring students of various learning preferences.

Finally, this initiative intends **to incorporate specialised social interaction** inside kindergarten e-learning platforms, allowing for peer-to-peer involvement and cooperative educational experiences. These rooms will mimic physical classroom dynamics, enabling conversations, collaborative work, and interactive engagements crucial for comprehensive early childhood education. This allows for the supplementation of educational content delivery while prioritising the development of social skills and encouraging a sense of community among children using e-learning platforms, thereby improving kindergarten e-learning experiences by solving the deficit in social interaction spaces while establishing an immersive and comprehensive learning environment for kindergarten children.

To conclude, the overall goals of this kindergarten e-learning software project include developing an engaging, personalised, and inclusive digital learning environment. The project intends to build an entirely novel standard in digital education for kindergarten children by solving difficulties seen in current e-learning platforms, establishing itself as a valued and effective instrument in early childhood education.

1.6 Contributions

This kindergarten e-learning software has the potential to significantly contribute to kindergarten education and educational technology by addressing current challenges. This unique initiative intends to redefine and transform kindergarten education by moving away

from traditional methods and towards an interactive, engaging, and personalised learning experience powered by powerful digital technologies, hence setting new standards in digital learning for young children.

The app's capacity to personalise the learning process for young learners' requirements, preferences, and learning speeds represents a groundbreaking shift in educational practice. Integrating adaptive learning algorithms and customisable content material transforms educational material delivery into more effective and improves learning outcomes, making learning more effective and uniquely suited for each child. This personalised approach could lead to higher retention rates, increased interest in learning, and better overall academic results, creating a generation of young learners who are more engaged and better prepared for future educational challenges.

Furthermore, the app is intended to increase engagement and motivation among young learners. It converts learning into an entertaining and compelling journey by utilising a broad combination of interactive games, narrative, storytelling, and multimedia information, hence fostering the interest and love of children in learning at an early stage. This ability to captivate young learners and maintain their interest over time sets the basis for long-term excitement for school and lifelong learning habits, which is essential in today's fast-evolving educational environment.

Another noteworthy feature is the app's support for various learning methods. Recognising that children learn in multiple ways, the app provides different material delivery techniques that appeal to visual and auditory learners. This inclusiveness guarantees that the app is effective across many learners, making it an essential asset for individual learning and various educational settings.

Additionally, the app is critical in encouraging parental participation in their child's educational pathway. Features such as progress monitoring in the dashboard enable parents to monitor children's learning progress and actively engage in their child's learning process, eliminating the gap between home and school and reaffirming parents' critical role in early childhood education. This involvement not only improves the educational outcomes for the child but also fosters a more collaborative and supportive educational environment where parents and educators work together towards the child's academic success.

The software also provides a basic framework for future innovations in early childhood e-learning. It demonstrates the efficacy of digital learning tools in early childhood education, paving the path for future developments and improvements in this field. The app will also function as a social interaction platform for kindergarten students, mimicking the dynamics of a physical classroom and presenting new opportunities for collaborative learning and peer engagement in digital form, further improving kindergarten children's learning experience.

Finally, the proposed kindergarten e-learning software contributes significantly by improving learning experiences, accommodating varied learning requirements and preferences, including parents in the learning journey, and creating a firm platform for future educational technology improvements. Its contributions go beyond current educational outcomes, potentially impacting future educational technology and approaches, making it a project with both present and long-term worth.

1.7 Report Organisation

This report is organised into eight chapters, each addressing a critical component of developing and evaluating "My Little Learner: E-Learning Wonderland," a kindergarten e-learning application.

Chapter 1, Introduction, presents the project's foundation by outlining the problem statement, background, motivation, scope, objectives, contributions, and overall report organisation. It establishes the need for an innovative digital learning platform tailored for young learners.

Chapter 2, Literature Review, analyses existing kindergarten e-learning platforms, evaluating their strengths, weaknesses, and challenges. It proposes solutions such as adaptive learning and gamification to guide the development of the proposed app.

Chapter 3, System Methodology, describes the Agile methodology adopted for the project. It details the six phases, which include Concept, Inception, Iteration, Release, Maintenance, and Retirement, and provides a timeline of tasks and milestones across this project.

Chapter 4, System Concept, outlines the project scope and requirements through comprehensive research on kindergarten education and a questionnaire survey of teachers and

parents of the kindergarten kids. These insights guided the identification of essential features such as engaging lessons, educational games, parental tools, and progress tracking to inform the system design.

Chapter 5, Project Inception, presents the system's structural foundation and design blueprint. It includes the system architecture, use case, activity, and system block diagrams to illustrate key workflows and interactions. Wireframes demonstrate the planned user interface layout. This chapter also outlines the hardware setup, development tools, and overall requirements necessary to implement the system effectively.

Chapter 6, Development Iterations and Refinements, documents the progressive development of the system through iterative builds. It details the initial working version, subsequent enhancements incorporating user feedback, and refinements to features and the user interface. This chapter also covers software testing processes, delivery of each iteration, challenges encountered during implementation, and feedback gathered to guide continuous improvement.

Chapter 7, Product Release and Deployment, presents the final validation and evaluation of the system before release. It outlines the system testing procedures, including end-to-end functional testing and summative usability testing, to ensure the application operates as intended. The chapter also evaluates whether the project objectives have been achieved and summarises the outcomes of the testing and evaluation process.

Chapter 8, Conclusion and Recommendations, summarises the project's achievements, offers practical recommendations for future enhancements, and outlines the planned maintenance and retirement phases to ensure long-term sustainability.

1.8 Chapter Summary

This chapter sets the stage for the project by explaining why this kindergarten e-learning mobile application was developed. It highlights the lack of interactive and engaging digital tools for early childhood education, especially those that combine entertainment with learning. The chapter clearly defines the problem, which is that traditional learning methods are often not effective for young children, and proposes a solution in the form of a mobile educational app. It also outlines the main objectives of the project, which include creating an app that supports

fun, interactive, and accessible learning experiences. The introduction concludes by specifying the scope of the project and identifying its expected contributions.

Chapter 2
Literature Review

The purpose of Chapter 2 is to give an in-depth overview of the current research and educational platforms essential to creating a successful kindergarten e-learning application. This chapter reviews current e-learning platforms, including Khan Academy Kids, SplashLearn, Endless Reader, and Praadis Education Junior, to determine their features, strengths, and limitations. This evaluation shows the critical elements required for creating a practical e-learning application for kindergarten-aged children by comparing various platforms. The chapter expands more profoundly into the challenges and opportunities of developing kindergarten age-appropriate e-learning programs, addressing concerns regarding social interaction, boredom, varied learning styles, distraction, and a deficiency in user-centred design. Finally, suggestions for improving the performance of e-learning platforms for young learners are explored, with a particular emphasis on integrating push notifications, sustainable development concepts, and engaging educational content material.

2.1 Existing Kindergarten E-learning Platform

To gain insight into the current kindergarten e-learning platform, four popular kindergarten e-learning platforms have been reviewed, which include Khan Academy Kids, SplashLearn, Endless Reader, and Praadis Education Junior.

2.1.1 Khan Academy Kids

Khan Academy Kids [11] offers diverse maths, reading, and science learning materials. It also includes interactive games, movies, and exercises to capture children's interest and encourage learning through fun. It encourages children to use virtual stickers and congratulatory messages. However, it may lack specialised social interaction areas, hindering collaborative learning experiences among their classmates. It may also lack a notification system for reminders. Although it has a tool that allows parents to restrict their children's access to

particular materials, it lacks a complete dashboard that provides deep insights into a child's learning experience.

Figure 2.1 Khan Academy

2.1.2 SplashLearn

SplashLearn [12] is a fun and comprehensive educational platform that makes maths and reading exciting and effective for children of all ages. SplashLearn, designed for children aged 3 to 12, provides a personalised and interactive maths curriculum linked with educational standards. SplashLearn seeks to change how children view and engage with mathematics through various games, lessons, and exercises. The platform delivers a structured yet enjoyable environment that promotes conceptual comprehension, creative thinking, and problem-solving abilities while adjusting to the learning rate of each kid. SplashLearn's straightforward UI and engaging content aim to encourage confidence and an interest in maths in young learners.

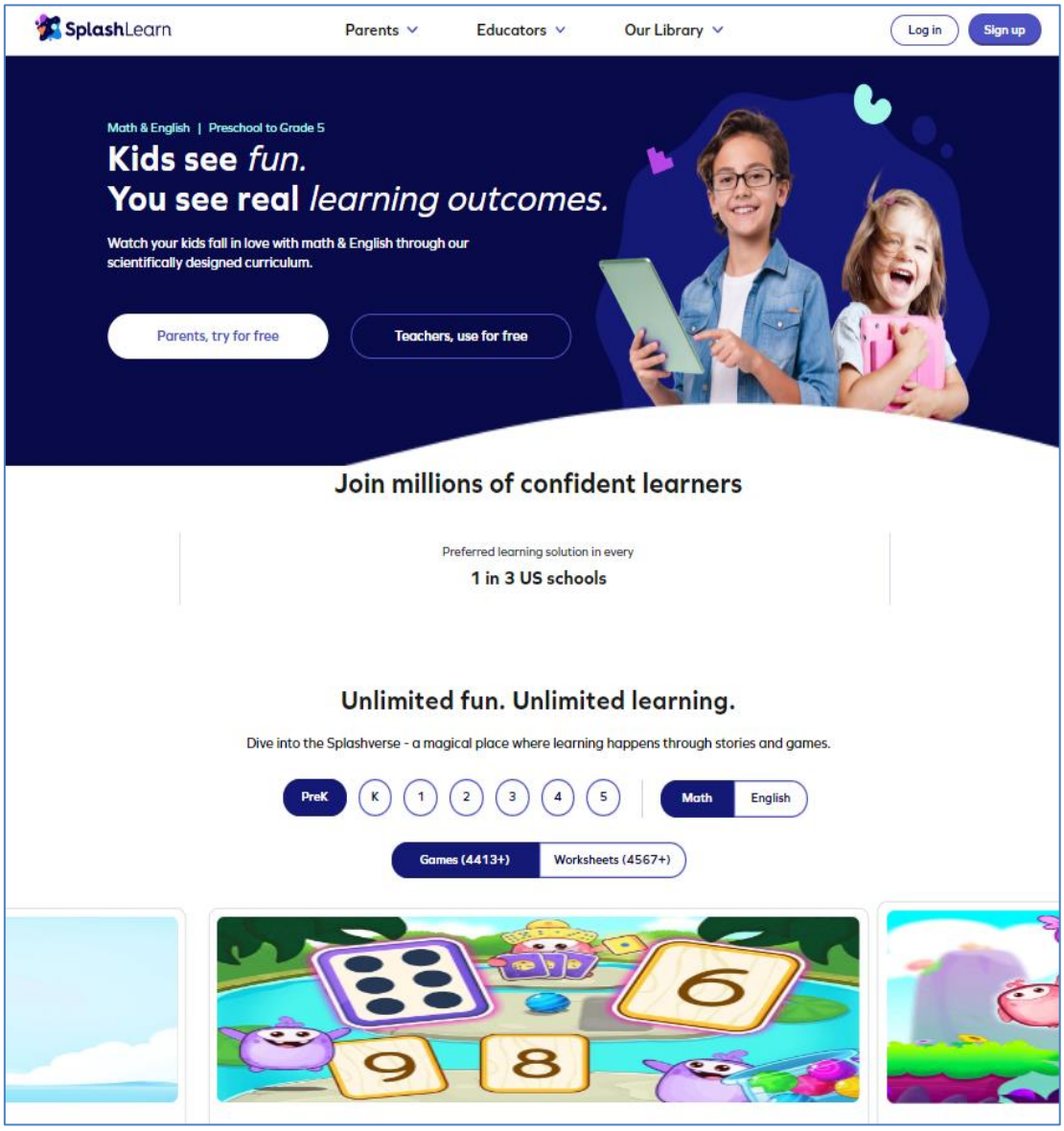
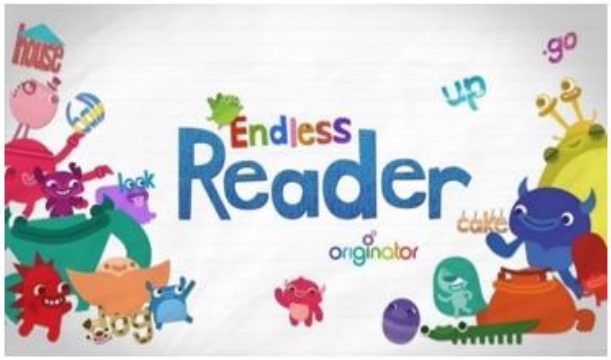


Figure 2.2 SplashLearn

2.1.3 Endless Reader

Endless Reader [13] is a playful software that educates young children on sight words and early reading abilities. It provides a pleasant and dynamic environment in which children may learn sight words through amusing animations and interactive games. Endless Reader delivers a rich educational experience for children by using brilliant and colourful images to help them recognise words, comprehend their meanings, and learn how to employ them in sentences. The software reinforces word identification and understanding through various engaging exercises and games, making the learning process entertaining and compelling. Endless Reader strives to provide young learners with a solid basis for literacy skills while keeping them delighted and engaged. The software has customisable difficulty levels, powerful performance monitoring capabilities, and material in several languages.



Winner of Apple's ***App Store Best of 2013*** award!

As a follow-up to Endless Alphabet, set the stage for early reading success with Endless Reader! This app introduces "sight words", the most commonly used words in school, library, and children's books. Kids need to recognize these words by sight in order to achieve reading fluency. Recognizing sight words is advantageous for beginning readers because many of these words have unusual spelling, cannot be sounded out using phonics knowledge, and often cannot be represented using pictures.

Kids will have a blast learning sight words and their context and usage with the adorable Endless monsters. Each word features an interactive word puzzle with letters that come alive, and then a sentence puzzle with words that become what they describe. See the word "dog" as a barking dog, and the word "up" reach for the sky!

Features:

- 6 words free to try with additional word packs available for purchase. Even more Reader Packs will be available for purchase in the future.
- Delightful animations reinforce sight recognition of words in a fun and interactive way.
- Word puzzles reinforce spelling using lower-case letters and the sentence puzzles teach definition and usage (in addition to sight recognition).
- Endless Reader was designed with your children in mind. There are no high scores, failures, limits or stress. Your children can interact with the app at their own pace.

Figure 2.3 Endless Reader

2.1.4 Praadis Education Junior

Praadis Education Junior [14] is an educational software for early learners that provides interactive material to engage kids in various learning activities. It focuses primarily on two topics, mathematics and English, entertainingly and engagingly. The software usually uses quizzes, games, puzzles, and graphics to make learning enjoyable while concentrating on essential educational ideas appropriate for young children. It frequently tailors its material to fit with kindergarten syllabi to foster core abilities in children in an enjoyable and instructional manner.

Figure 2.4 Praadis Education Junior

2.1.5 Comparison between Existing Kindergarten E-learning Platforms

Features Apps	Khan Academy Kids	Splash Learn	Endless Reader	Praadis Education Junior	My Little Learner: E-learning Wonderland
Learning Activities	Offers a wide range of activities, including math, language, reading, and social-emotional learning	Focus on math and reading skills	Focus only on reading	Focus only on math and English	Focus only on math and English
Adaptive Personalised Learning	Yes	Yes	No	No	Yes
Prize or Reward system	virtual stickers and congratulatory messages	Virtual coins as rewards	No	No	Virtual prize sticker and congratulatory message
Parental Involvement	Offer Parent Control to limit access to specific sections of the app	Offer Reports, including progress tracking to parents	Limited Parental involvement	Offer Assessment Analysis Report	Offer an analytic dashboard, including progress tracking, to parents
Notification Features as a Reminder	No	No	No	No	Yes, it offers a reminder notification that can be viewed and managed in calendar form.
Social Interaction Space	No	No	No	No	Yes, an integrated collaborative discussion space
Support Diverse Learning Styles	Covers various learning styles through interactive tools	Provide only worksheets and games	Limited	Supports multiple learning styles with activities	Covers various learning styles through interactive elements and activities

Table 2.1 Comparison between Existing Kindergarten E-learning Platforms

2.2 Challenges and Potential

2.2.1 Kindergarten Children Quickly Feel Bored

Alshamrani, A. S. (2024) highlights a crucial issue in kindergarten-aged children's e-learning platforms: children tend to get bored quickly. This study, conducted amid the COVID-19 epidemic, gives essential insights into how e-learning techniques adapt and function, particularly for this young age group. It emphasises the educational characteristics of kindergarten children, emphasising their quick behavioural shifts and the crucial need for a fascinating and dynamic learning environment. The study underscores the importance of physical, social, and motor development at this level, emphasising the need to consider these factors while developing educational techniques, particularly in kindergarten e-learning. It emphasises the necessity of personalising educational techniques for young children to meet their changing developmental requirements across several domains, offering an engaging and interactive learning experience compatible with their features and natural inclinations [3].

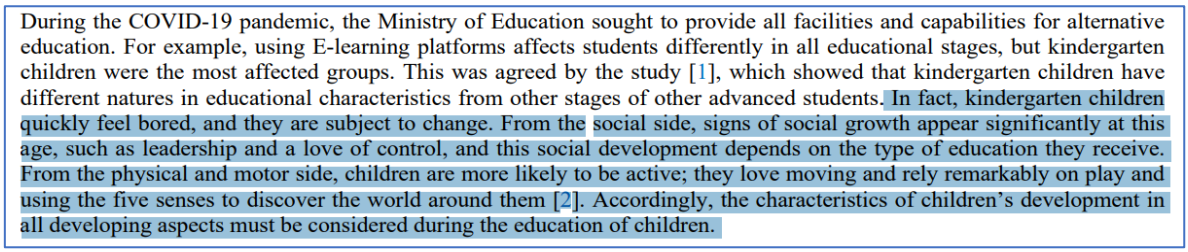
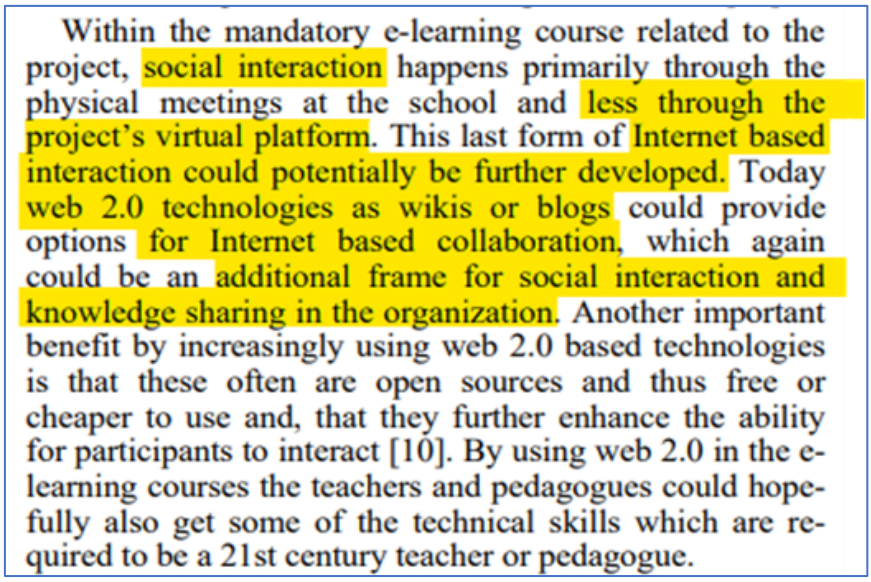

During the COVID-19 pandemic, the Ministry of Education sought to provide all facilities and capabilities for alternative education. For example, using E-learning platforms affects students differently in all educational stages, but kindergarten children were the most affected groups. This was agreed by the study [1], which showed that kindergarten children have different natures in educational characteristics from other stages of other advanced students. In fact, kindergarten children quickly feel bored, and they are subject to change. From the social side, signs of social growth appear significantly at this age, such as leadership and a love of control, and this social development depends on the type of education they receive. From the physical and motor side, children are more likely to be active; they love moving and rely remarkably on play and using the five senses to discover the world around them [2]. Accordingly, the characteristics of children's development in all developing aspects must be considered during the education of children.

Figure 2.5 The fact that Kindergarten Children get Bored Quickly

2.2.2 Social Interaction

Hansen, L., Hansen, O., & Andersen, P. (2012) investigated the seamless integration of e-learning approaches in school and kindergarten education. Their research provides a complete view of how e-learning technologies function within the larger educational landscape. Physical meetings at school remain the critical conduit for social engagement in required e-learning courses, with virtual platforms playing a secondary role. Web 2.0 technologies such as wikis and blogs have emerged as valuable tools for enhancing social interaction and fostering information exchange. These platforms, which are frequently open-source or low-cost, dramatically increase participant engagement by giving more channels for interaction. E-learning functions as a centralised hub inside specific schools or kindergartens, providing

insight into various team activities and serving as a collaborative area for shared conversations and activities [10].

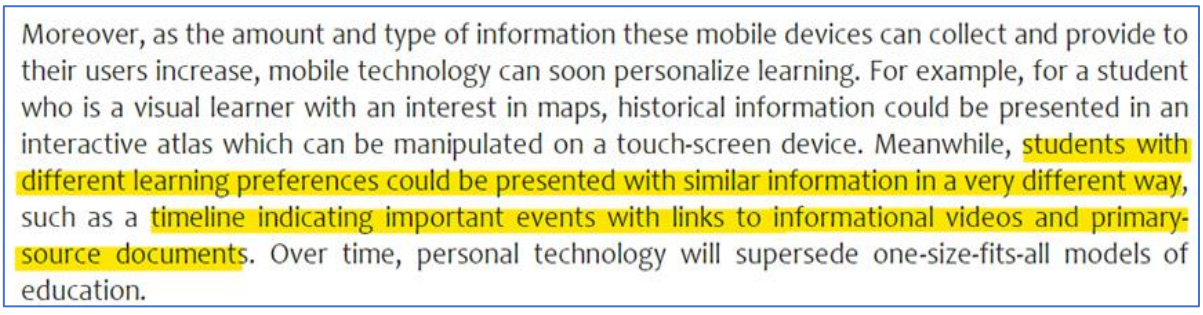


Within the mandatory e-learning course related to the project, social interaction happens primarily through the physical meetings at the school and less through the project's virtual platform. This last form of Internet based interaction could potentially be further developed. Today web 2.0 technologies as wikis or blogs could provide options for Internet based collaboration, which again could be an additional frame for social interaction and knowledge sharing in the organization. Another important benefit by increasingly using web 2.0 based technologies is that these often are open sources and thus free or cheaper to use and, that they further enhance the ability for participants to interact [10]. By using web 2.0 in the e-learning courses the teachers and pedagogues could hopefully also get some of the technical skills which are required to be a 21st century teacher or pedagogue.

Figure 2.6 Social Interaction Implementation

2.2.3 Various Learning Preference

Tuliao D. P. et al. (2015) looked at the development process of kindergarten-specific mobile learning applications. Their study provides practical insights into the obstacles and issues of generating instructional content for this age range. This research directly applies to creating kindergarten e-learning apps, stressing technological and pedagogical issues. Meanwhile, learners with various learning styles may be presented with comparable knowledge in diverse ways, such as a timeline highlighting key events with connections to informative films and source papers. Personal technology will eventually supplant one-size-fits-all educational paradigms [9].



Moreover, as the amount and type of information these mobile devices can collect and provide to their users increase, mobile technology can soon personalize learning. For example, for a student who is a visual learner with an interest in maps, historical information could be presented in an interactive atlas which can be manipulated on a touch-screen device. Meanwhile, students with different learning preferences could be presented with similar information in a very different way, such as a timeline indicating important events with links to informational videos and primary-source documents. Over time, personal technology will supersede one-size-fits-all models of education.

Figure 2.7 Different Learning Methods of Students

Xia M. et al. (2019) examined student learning habits in K-12 mathematics e-learning systems. The study's results on user interaction and engagement with e-learning platforms give valuable insights that may be used in kindergarten e-learning settings. It was noted that the question's difficulty level needed to be altered to suit kindergarteners and better understand individual learners' detailed problem-solving techniques [15].

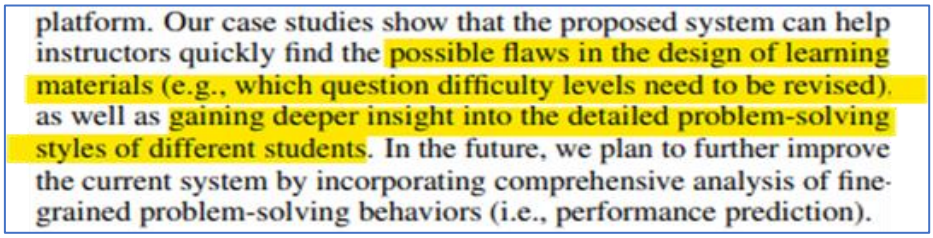
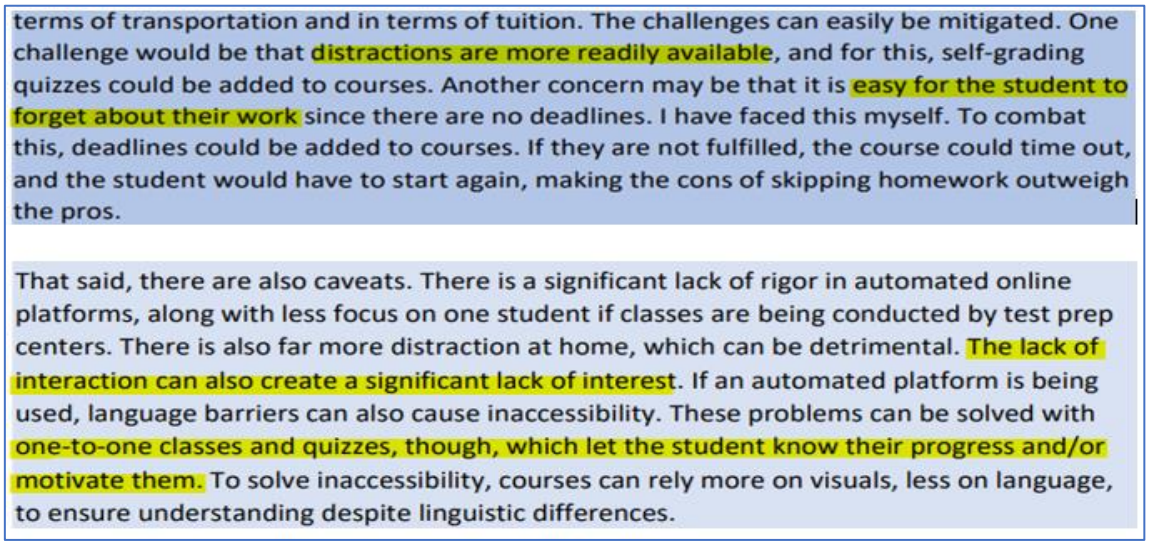

platform. Our case studies show that the proposed system can help instructors quickly find the possible flaws in the design of learning materials (e.g., which question difficulty levels need to be revised). as well as gaining deeper insight into the detailed problem-solving styles of different students. In the future, we plan to further improve the current system by incorporating comprehensive analysis of fine-grained problem-solving behaviors (i.e., performance prediction).

Figure 2.8 Different Difficulty-Level Questions for Students

2.2.4 Children's Distraction and Forgettability

A. Singh (2021) investigated the socioeconomics of e-learning, giving crucial insights into the socioeconomic constraints and limits in today's e-learning scene. This viewpoint is essential for ensuring that e-learning apps are accessible and egalitarian. It claimed that the biggest problem would be that distractions would be more readily available, and that self-grading tests may be included in courses to help with this. Another issue is that there are no deadlines, which makes it easy for students to forget about their work. In addition, a lack of engagement with children leads to a lack of interest in children. However, these issues may be addressed by one-on-one lessons and tests, which inform and stimulate students [16].


terms of transportation and in terms of tuition. The challenges can easily be mitigated. One challenge would be that distractions are more readily available, and for this, self-grading quizzes could be added to courses. Another concern may be that it is easy for the student to forget about their work since there are no deadlines. I have faced this myself. To combat this, deadlines could be added to courses. If they are not fulfilled, the course could time out, and the student would have to start again, making the cons of skipping homework outweigh the pros.

That said, there are also caveats. There is a significant lack of rigor in automated online platforms, along with less focus on one student if classes are being conducted by test prep centers. There is also far more distraction at home, which can be detrimental. The lack of interaction can also create a significant lack of interest. If an automated platform is being used, language barriers can also cause inaccessibility. These problems can be solved with one-to-one classes and quizzes, though, which let the student know their progress and/or motivate them. To solve inaccessibility, courses can rely more on visuals, less on language, to ensure understanding despite linguistic differences.

Figure 2.9 Children's Distraction and Forgettability

2.2.5 Lack of User Perspectives

According to Zhang &Liao (2015), many developers of mobile education applications design products with subjective ideas that do not fully consider the needs of learners, and lead products are not popular. Emphasise the user's perspective, taking learners' needs as the starting point, and thoroughly studying learners' characteristics and critical needs to help developers clarify the work design ideas. The core function of educational apps, which are easy to use, artistic, enjoyable, and other factors that directly affect the learning experience, should be given enough attention. Also, preaching for entertainment and enhancing to meet the personalised needs of users will enable educational Apps to become more popular and win the recognition of learners [17].

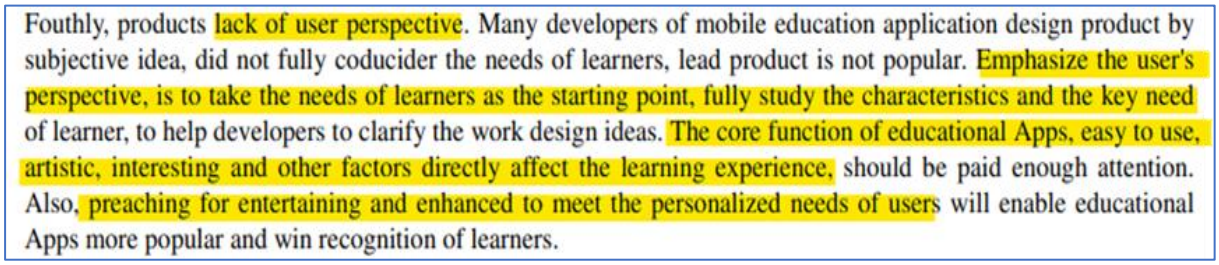

Fouthly, products lack of user perspective. Many developers of mobile education application design product by subjective idea, did not fully coducider the needs of learners, lead product is not popular. Emphasize the user's perspective, is to take the needs of learners as the starting point, fully study the characteristics and the key need of learner, to help developers to clarify the work design ideas. The core function of educational Apps, easy to use, artistic, interesting and other factors directly affect the learning experience, should be paid enough attention. Also, preaching for entertaining and enhanced to meet the personalized needs of users will enable educational Apps more popular and win recognition of learners.

Figure 2.10 Lack of User Perspectives

2.3 Proposed Solutions

2.3.1 E-Learning and Sustainable Development

L. Donath et al. (2020) explored e-learning platforms from the perspective of sustainable development education. This article is noteworthy because it may highlight limits or inadequacies in current e-learning systems, particularly regarding material addressing sustainable development concepts. The proposed multi-stakeholder environment is divided into two sections: the learning environment, which is primarily for students, trainees, tutors, and mentors, and the virtual sustainability centre, which is for online meetings, workshops, counselling, and so on. Various textual, digital, and multimedia materials, including pre-recorded online coaching, movies, and games, enhance long-term learning. Various gamification strategies, such as tracking and displaying the learner's progress, role-playing, and similar, should be employed in the course design process to engage online learners. The article

provides a conceptual framework of the learner's journey and an integration of entertainment ideas into an E-learning platform [18].

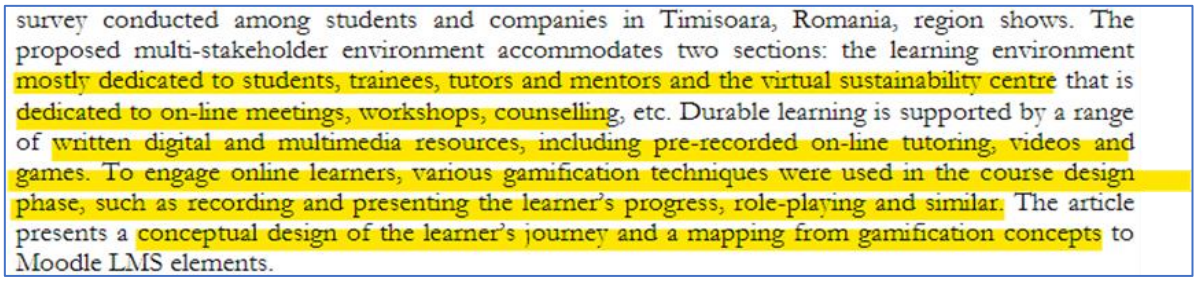
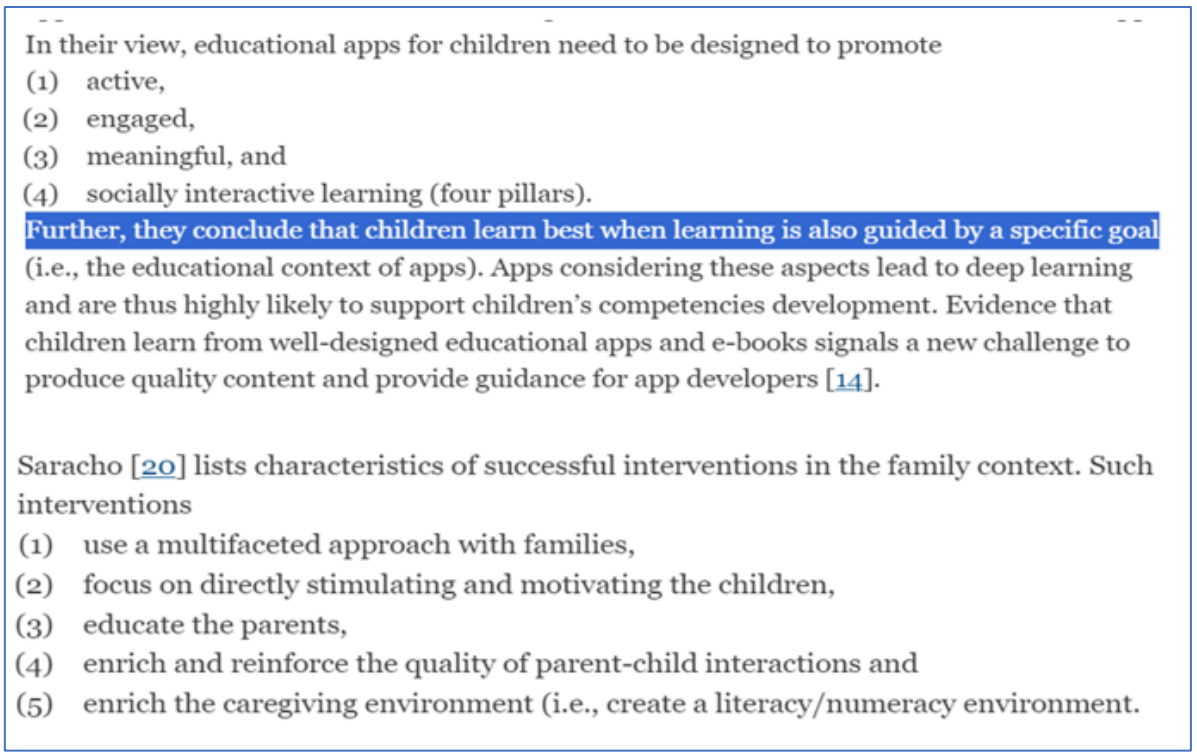

survey conducted among students and companies in Timisoara, Romania, region shows. The proposed multi-stakeholder environment accommodates two sections: the learning environment mostly dedicated to students, trainees, tutors and mentors and the virtual sustainability centre that is dedicated to on-line meetings, workshops, counselling, etc. Durable learning is supported by a range of written digital and multimedia resources, including pre-recorded on-line tutoring, videos and games. To engage online learners, various gamification techniques were used in the course design phase, such as recording and presenting the learner's progress, role-playing and similar. The article presents a conceptual design of the learner's journey and a mapping from gamification concepts to Moodle LMS elements.

Figure 2.11 Incorporate Interesting Elements

According to Niklas et al. (2020), an effective kindergarten e-learning app must focus on directly engaging and inspiring children, educating parents, enhancing and strengthening the standard of parent-child interactions, and enhancing the caregiving environment. As a result, the app must include novel, effective, and simple intervention options that address children's early and later reading and mathematics abilities [4].


In their view, educational apps for children need to be designed to promote
(1) active,
(2) engaged,
(3) meaningful, and
(4) socially interactive learning (four pillars).
Further, they conclude that children learn best when learning is also guided by a specific goal (i.e., the educational context of apps). Apps considering these aspects lead to deep learning and are thus highly likely to support children's competencies development. Evidence that children learn from well-designed educational apps and e-books signals a new challenge to produce quality content and provide guidance for app developers [14].

Saracho [20] lists characteristics of successful interventions in the family context. Such interventions
(1) use a multifaceted approach with families,
(2) focus on directly stimulating and motivating the children,
(3) educate the parents,
(4) enrich and reinforce the quality of parent-child interactions and
(5) enrich the caregiving environment (i.e., create a literacy/numeracy environment.

Figure 2.12 How Should Educational Apps be Designed

According to Maphosa, V., and Dube, B. (2021), the application should incorporate animation and sound to help learners grasp the instructions. The app's music provides a fun and creative environment where learners can easily explore the program. [19]

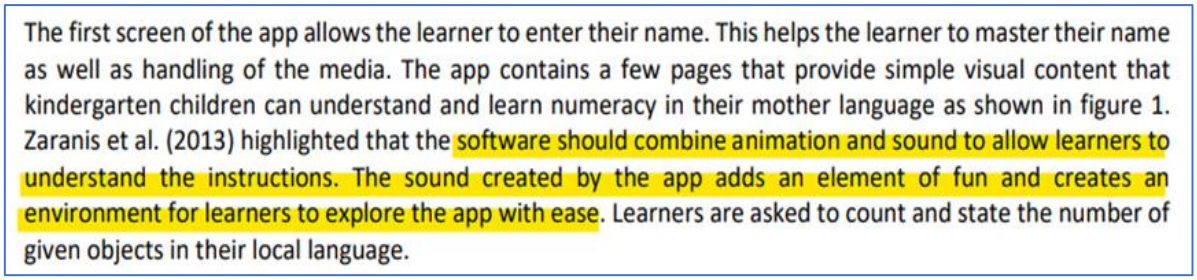

The first screen of the app allows the learner to enter their name. This helps the learner to master their name as well as handling of the media. The app contains a few pages that provide simple visual content that kindergarten children can understand and learn numeracy in their mother language as shown in figure 1. Zaranis et al. (2013) highlighted that the software should combine animation and sound to allow learners to understand the instructions. The sound created by the app adds an element of fun and creates an environment for learners to explore the app with ease. Learners are asked to count and state the number of given objects in their local language.

Figure 2.13 Integration of Animation and Sound

A. Chatzopoulos et al. (2023) performed a thorough review of 50 educational applications accessible on the Google Play Store, with a focus on early childhood education. This research helps comprehend the present landscape of educational applications for kindergarten, providing a complete assessment of the types and features of e-learning tools. According to the researchers, most educational applications lack pedagogical value and must be enhanced in all areas, including instructional content, design, application functioning, and technological characteristics [20].

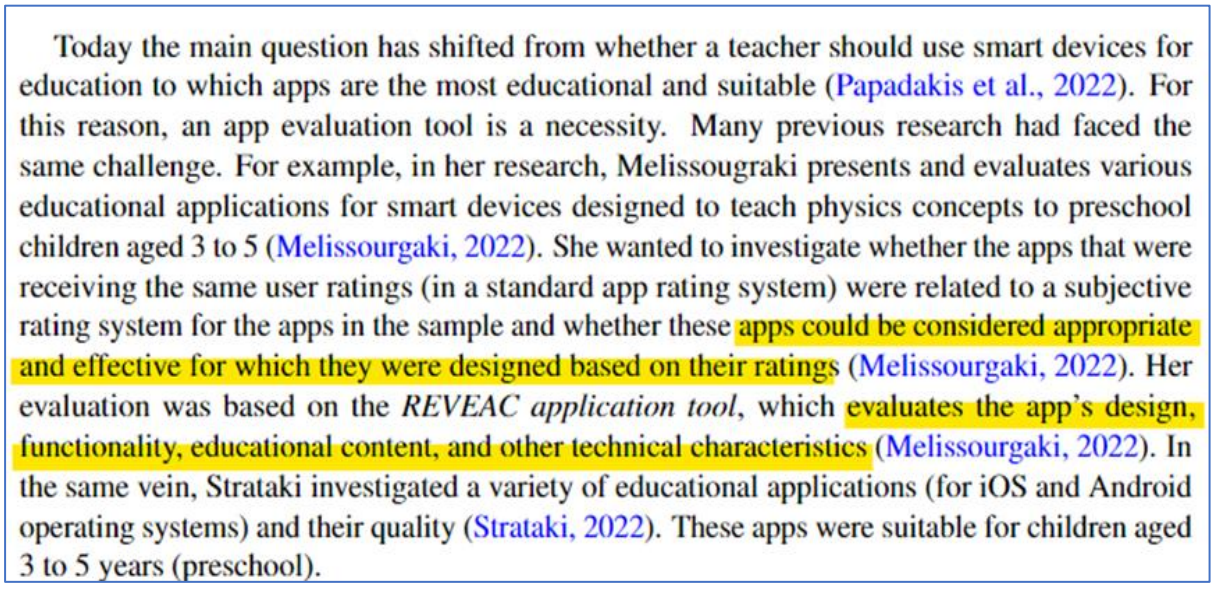
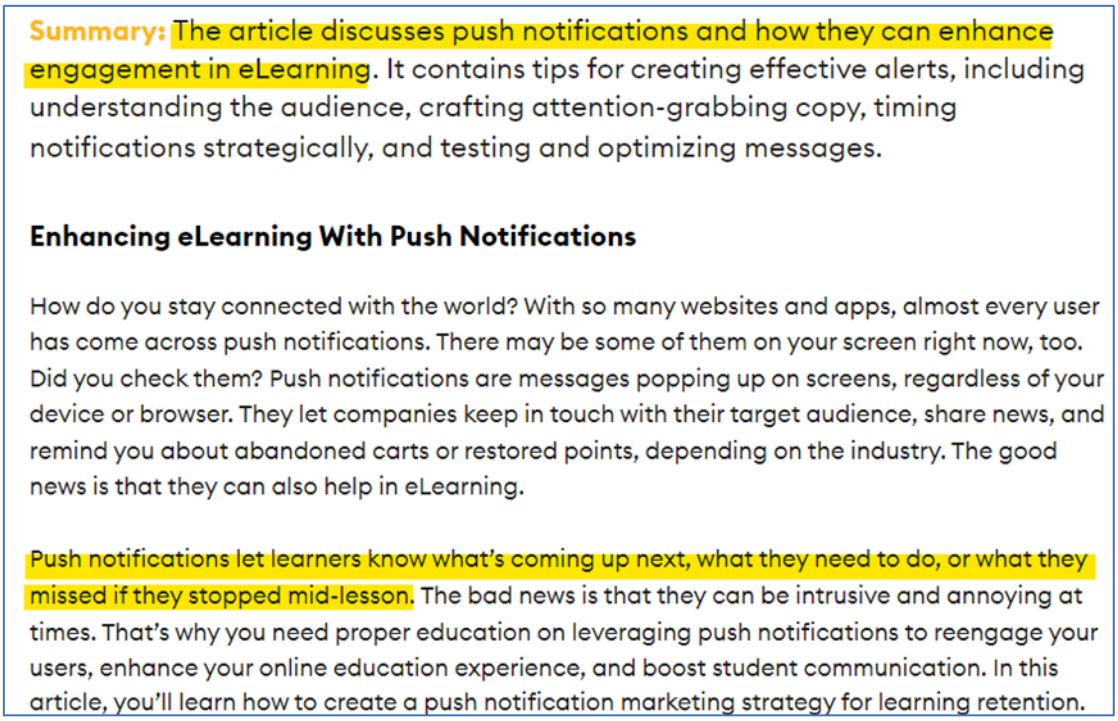

Today the main question has shifted from whether a teacher should use smart devices for education to which apps are the most educational and suitable (Papadakis et al., 2022). For this reason, an app evaluation tool is a necessity. Many previous research had faced the same challenge. For example, in her research, Melissougraki presents and evaluates various educational applications for smart devices designed to teach physics concepts to preschool children aged 3 to 5 (Melissourgaki, 2022). She wanted to investigate whether the apps that were receiving the same user ratings (in a standard app rating system) were related to a subjective rating system for the apps in the sample and whether these apps could be considered appropriate and effective for which they were designed based on their ratings (Melissourgaki, 2022). Her evaluation was based on the *REVEAC application tool*, which evaluates the app's design, functionality, educational content, and other technical characteristics (Melissourgaki, 2022). In the same vein, Strataki investigated a variety of educational applications (for iOS and Android operating systems) and their quality (Strataki, 2022). These apps were suitable for children aged 3 to 5 years (preschool).

Figure 2.14 Characteristics of Educational Apps

2.3.2 Enhancing E-learning with Push Notifications

The eLearning Industry (2023) says push notifications can improve e-learning. By adding alerts to e-learning, users may be reminded to take action and informed about upcoming tasks, necessary actions, and lessons missed if they pause in the middle of a session. Therefore, Push

notifications are required to reactivate users, improve the e-learning experience, and improve student communication [5].



Summary: The article discusses push notifications and how they can enhance engagement in eLearning. It contains tips for creating effective alerts, including understanding the audience, crafting attention-grabbing copy, timing notifications strategically, and testing and optimizing messages.

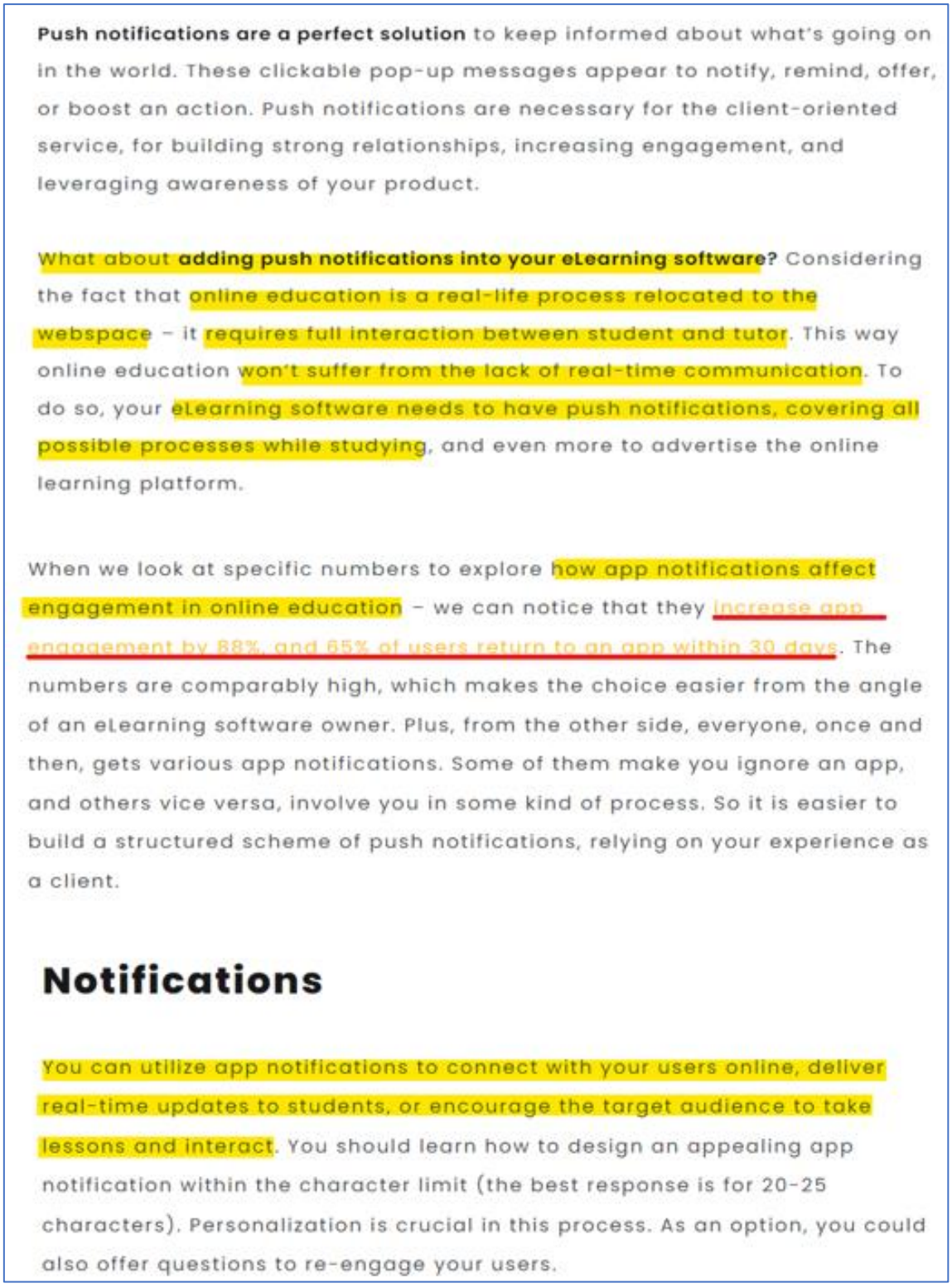
Enhancing eLearning With Push Notifications

How do you stay connected with the world? With so many websites and apps, almost every user has come across push notifications. There may be some of them on your screen right now, too. Did you check them? Push notifications are messages popping up on screens, regardless of your device or browser. They let companies keep in touch with their target audience, share news, and remind you about abandoned carts or restored points, depending on the industry. The good news is that they can also help in eLearning.

Push notifications let learners know what's coming up next, what they need to do, or what they missed if they stopped mid-lesson. The bad news is that they can be intrusive and annoying at times. That's why you need proper education on leveraging push notifications to reengage your users, enhance your online education experience, and boost student communication. In this article, you'll learn how to create a push notification marketing strategy for learning retention.

Figure 2.15 Enhancing eLearning with Push Notification

Incora, a European software company, has underlined the need to incorporate push notifications into online education software to improve user engagement and allow real-time contact between students and tutors. It emphasises how push notifications help to sustain contact, raise awareness, and strengthen relationships inside online education systems. Statistics indicate that eLearning software may guarantee constant user engagement by integrating push notifications. Within 30 days, the app's engagement increased by 88%, and its return rate was 65%. These figures highlight the enormous influence of alerts on user behaviour, arguing for their incorporation in e-learning systems. Furthermore, the article recommends using the user experience as a guide for developing organised push notification techniques that resonate with users, promoting engagement rather than prompting deletion [6].



Push notifications are a perfect solution to keep informed about what's going on in the world. These clickable pop-up messages appear to notify, remind, offer, or boost an action. Push notifications are necessary for the client-oriented service, for building strong relationships, increasing engagement, and leveraging awareness of your product.

What about **adding push notifications into your eLearning software?** Considering the fact that online education is a real-life process relocated to the webspace – it requires full interaction between student and tutor. This way online education won't suffer from the lack of real-time communication. To do so, your eLearning software needs to have push notifications, covering all possible processes while studying, and even more to advertise the online learning platform.

When we look at specific numbers to explore how app notifications affect engagement in online education – we can notice that they increase app engagement by 88%, and 65% of users return to an app within 30 days. The numbers are comparably high, which makes the choice easier from the angle of an eLearning software owner. Plus, from the other side, everyone, once and then, gets various app notifications. Some of them make you ignore an app, and others vice versa, involve you in some kind of process. So it is easier to build a structured scheme of push notifications, relying on your experience as a client.

Notifications

You can utilize app notifications to connect with your users online, deliver real-time updates to students, or encourage the target audience to take lessons and interact. You should learn how to design an appealing app notification within the character limit (the best response is for 20-25 characters). Personalization is crucial in this process. As an option, you could also offer questions to re-engage your users.

Figure 2.16 Adding Push Notification to E-learning

2.3.3 Create Engaging E-learning

Luca&Friends has offered methods for developing engaging e-learning. It noted that because each child has a distinctive learning method, several online learning techniques should be provided to help children improve their learning skills. Furthermore, an e-learning system must combine visuals and interaction, such as music, vibrant images, and engaging animations, to provide a pleasurable experience for children. Additionally, ensure the online educational exercises are entertaining and exciting, and avoid assignments that appear overly challenging. It must also allow teachers and instructors to track the learner's progress, identifying areas where they may require extra help or going over previous curriculum so that students comprehend things before going on [7].

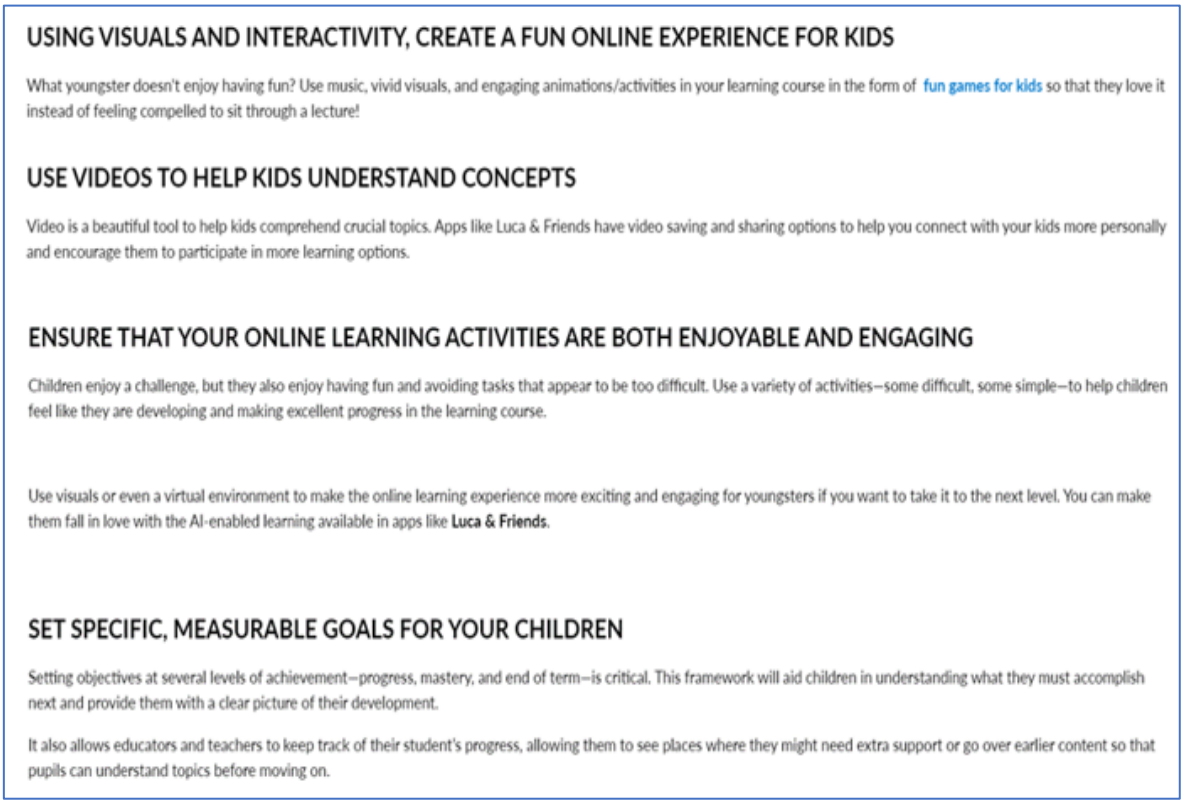
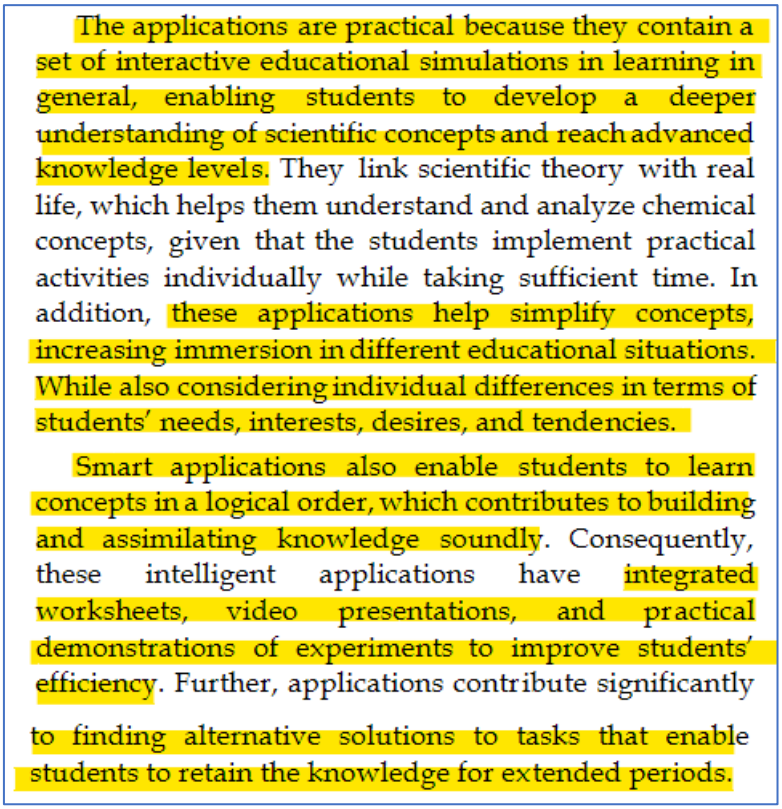


Figure 2.17 Criteria of Engaging E-learning

2.4 Importance of Kindergarten E-learning App

S. Alneyadi et al. (2023) evaluated the impact of intelligent e-learning applications on eighth-grade students' academic progress. The findings offer valuable insights that might be used in kindergarten instruction. According to the findings, interactive material and personalised

learning experiences in e-learning applications may also benefit younger learners. The E-learning Applications are hands-on instructional simulations that connect scientific theory to real-world circumstances, allowing students to comprehend and examine chemical ideas. They simplify concepts, boost immersion, and take individual variances into account. Innovative programs assist learners in learning rationally and thoroughly. Assessments, instructional videos, and practical demonstrations are integrated into the apps, increasing efficiency. These programmes also assist students in finding alternate solutions to challenges, allowing them to keep their knowledge for prolonged periods [21].


The applications are practical because they contain a set of interactive educational simulations in learning in general, enabling students to develop a deeper understanding of scientific concepts and reach advanced knowledge levels. They link scientific theory with real life, which helps them understand and analyze chemical concepts, given that the students implement practical activities individually while taking sufficient time. In addition, these applications help simplify concepts, increasing immersion in different educational situations. While also considering individual differences in terms of students' needs, interests, desires, and tendencies.

Smart applications also enable students to learn concepts in a logical order, which contributes to building and assimilating knowledge soundly. Consequently, these intelligent applications have integrated worksheets, video presentations, and practical demonstrations of experiments to improve students' efficiency. Further, applications contribute significantly to finding alternative solutions to tasks that enable students to retain the knowledge for extended periods.

Figure 2.18 Importance of Kindergarten E-learning

2.5 Chapter Summary

In short, Chapter 2 thoroughly analysed existing kindergarten e-learning platforms, identified significant challenges, and explored potential solutions. The literature review reveals that while current platforms are helpful in some areas, they frequently lack essential characteristics such as adaptive learning, collaborative spaces, and analytic insight, all necessary for engaging young learners. These findings validate the deficiencies in current e-learning platforms that can

hinder kindergarten kids' learning experiences, closely connected to the problem statement discussed in Chapter 1.

Furthermore, reviewing challenges, such as children's quick boredom, distraction, forgettability, and the need for various learning methods, is consistent with the project's scope. The findings of the literature analysis directly influence the project's objectives, which centre on improving user engagement, integrating adaptive learning, and presenting dashboard insights. Functionalities, including push notifications, gamification, and a cooperative social interaction area, should be integrated to solve these issues and achieve the primary objective.

Additionally, the literature analysis further indicates that implementing these improvements can significantly increase user engagement and the achievement of objectives. These insights will help shape the development of the intended kindergarten e-learning platform, ensuring that it tackles the problems identified while simultaneously satisfying young learners' educational needs and preferences. Overall, this chapter has provided an adequate foundation for the research, emphasising the importance of a well-organized, interactive, and comprehensive e-learning platform for kindergarten children that matches the project's aims and effectively addresses the problems mentioned in Chapter 1.

Chapter 3
System Methodology

Chapter 3 describes the methodology for establishing the kindergarten e-learning platform "My Little Learner: E-learning Wonderland." This chapter describes the implementation of Agile Methodology, which was selected due to its iterative development cycles and adaptability, which are critical for satisfying the shifting educational demands of kindergarten-aged children. The chapter also discusses the six stages of Agile development, which include Concept, Inception, Iteration, Release, Maintenance, and Retirement.

3.1 Methodology

Because of its adaptability, iterative development cycles, and flexibility, the **Agile Methodology** is chosen to create the Kindergarten E-learning Platform. The agile approach emphasises continuous feedback loops [22]. This adaptability allows for developing educational requirements and continually refining the platform's capabilities based on comments from teachers, parents, and kindergarten children. Agile promotes the production of modest, functional increments of the platform through iterative development, enabling early and regular validation from users and alignment with their developing demands. This collaborative approach promotes a user-centric design that emphasises quality, usability, and timely feedback response, resulting in an exciting and effective learning platform for children in kindergarten. There are six phases of Agile project development and management: Concept, Inception, Iteration, Release, Maintenance, and Retirement, as shown in Figure 3.1[23].

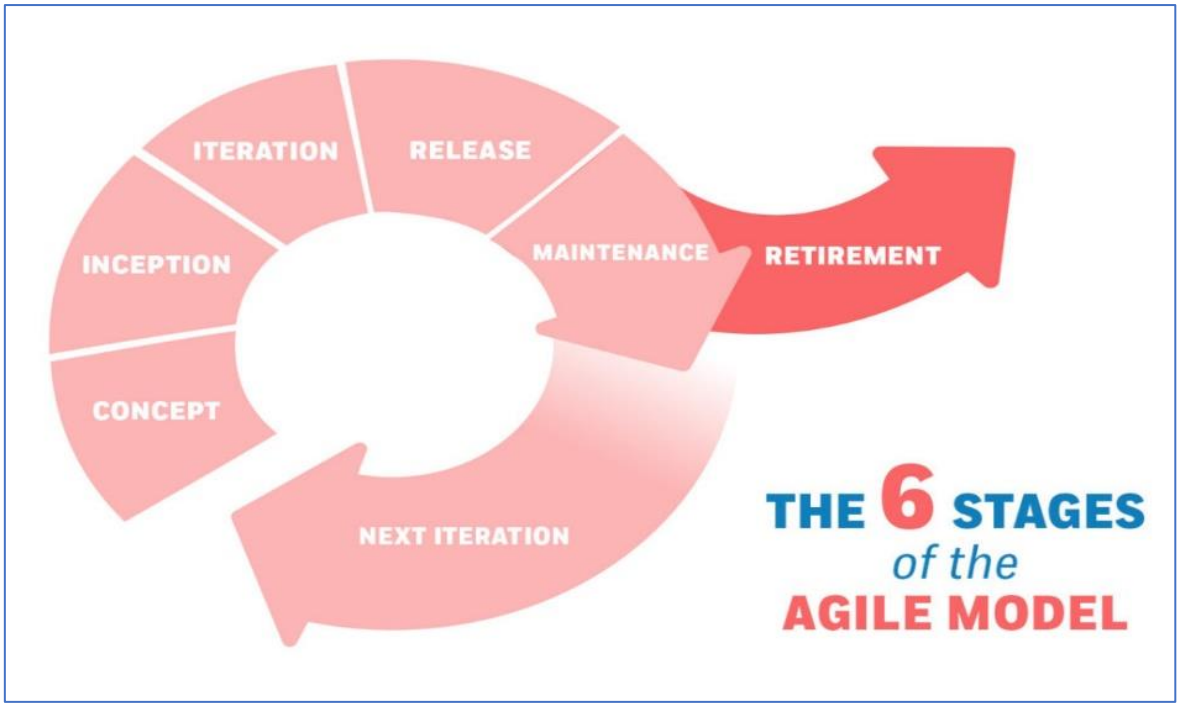


Figure 3.1 Agile Methodology

The **Concept** stage of an Agile project consists of defining the project scope and collecting requirements. It also involves identifying essential components of the system and analysing the needs and requirements of educators, kindergarten students, and parents.

During the **Inception** phase, design components such as user interface wireframes, activity diagram, and system architectures are developed while considering user requirements. The aim is to create a simple-to-use, kid-friendly, and visually appealing interface that meets the requirements outlined during the Concept phase.

The **Iteration** phase, often called the development phase, is the longest in Agile methodology and involves transforming the design into functional code. Both front-end and back-end development are carried out iteratively, with iterative cycles used to add features and gradually enhance the platform in response to feedback. The initial iteration will provide a foundation for development, with subsequent iterations concentrating on defining and improving the functionality or adding new features, depending on feedback.

During the **Release** stage, the software undergoes quality assurance testing and documentation. The aim is to guarantee functionality and usability and provide user instructions. The developed product will undergo a series of checks and tests to identify flaws and errors and ensure the final project meets objectives.

The **Maintenance** phase begins when the app is fully ready and offered to users. After deployment, ongoing assistance is available for problem repairs, updates, and user feedback. Regular improvements are planned to ensure that the platform remains functional and relevant.

The **Retirement** phase is when the app is phased out or replaced. This could include upgrading to a new version, adopting cutting-edge technology and demand, and ensuring that users receive adequate assistance during the transition.

3.2 Project Timeline

The project timeline outlines key milestones, task distributions, and the overall project flow, as shown in the Gantt charts. These charts provide a structured view of the project's phases, showing how tasks progress sequentially and in parallel to maximize efficiency. Each phase builds logically on the previous one, balancing development, documentation, testing, and evaluation activities.

Figures 3.2, 3.3, and 3.4 present the detailed schedules for the proposal writing, FYP1, and FYP2 semesters. The charts clearly show how tasks are organized, and time is allocated to ensure steady progress toward project completion.

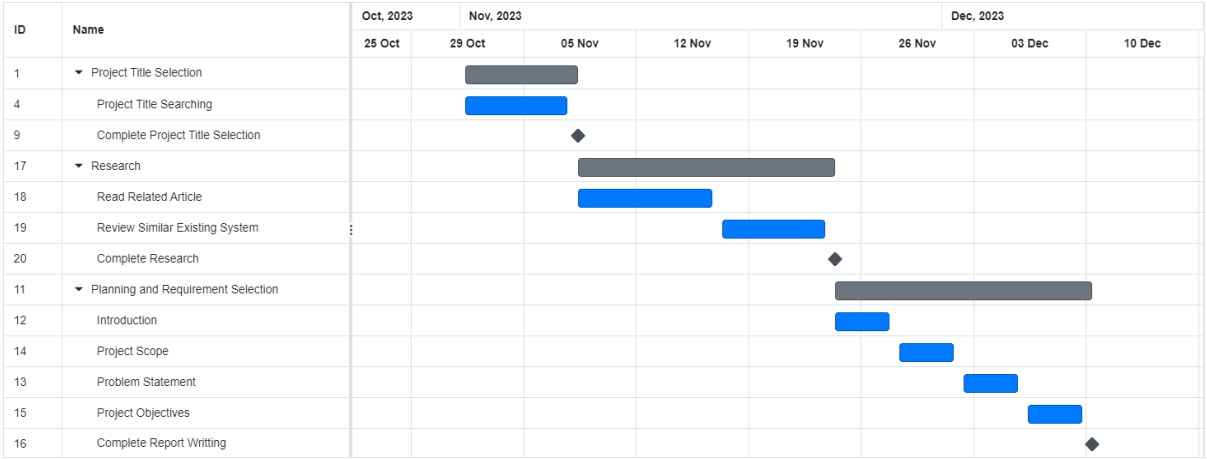


Figure 3.2 Proposal Writing Gantt Chart

Figure 3.2 shows the Gantt chart during proposal writing, covering the period from November to December 2023. The timeline is structured into three main phases, each comprising specific tasks to guide the systematic development of the project proposal. The first phase, Project Title Selection, occurs from 1 November to early 9 November, which begins with project title

searching to explore potential project topics. The second phase, Research, spans from 9 November to 26 November, includes two tasks, which are reading a related article and reviewing similar existing systems, to explore and finalize a suitable project topic. The final phase, Planning and Requirement Selection, starts from 26 November to 10 December, consists of sequential tasks starting with the introduction section, followed by project scope, problem statement, and project objectives.

The chart demonstrates a logical progression from topic selection through research to detailed planning and documentation. Each phase builds upon the previous one, with appropriate time allocated to each task based on its complexity.

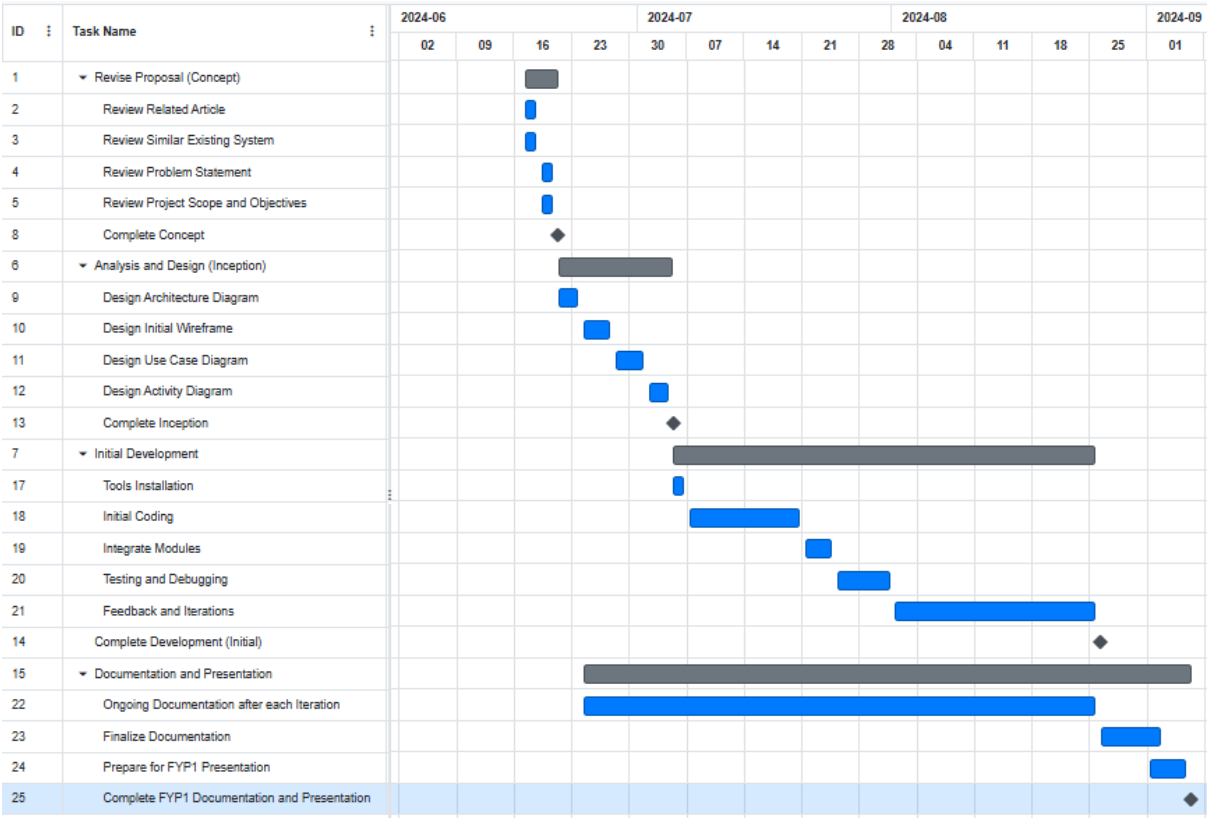


Figure 3.3 FYP 1 Gantt Chart

Figure 3.3 illustrates the Gantt chart outlining the project timeline, including task distribution and milestones for the Final Year Project (FYP1) semester, which includes the project concept, inception, and initial development iteration. The primary goal of FYP1 is to provide the solid basis for the project.

The project begins with the proposal revision, scheduled from 17 June to 21 June 2024. During this period, the project proposal is refined by reviewing relevant articles, analysing current systems, improving the problem statement, and finalising the project's goals and scope.

The project then enters the Analysis and Design (Inception) phase from 21 June to 5 July 2024. Key activities involve designing the system architecture, use case diagrams, activity diagrams, and user interface wireframes. This phase ensures a clear system blueprint to guide the subsequent development.

From 5 July to 25 August 2024, the initial development (Iteration) phase will start, which includes tool installation, the initial coding, modules integration, testing, debugging, and feedback-driven iterations. Concurrently, following the Agile strategy, documentation is being updated iteratively from the Inception Stage to the end of the initial Iteration phase. Continuing documentation ensures that all project activities are appropriately documented, allowing for easy reference and providing transparency as the project progresses.

As the semester proceeds, the focus switches to finalising the FYP1 report and preparing for the presentation, scheduled from 24 June to 6 September 2024. This includes combining all iterative documentation into a thorough report covering the entire FYP1 phase. During this period, any remaining gaps are filled, guaranteeing all paperwork is finished and the project is ready to be evaluated. While the report is almost complete, the preparation for the FYP1 presentation begins.

After that, the development of My Little Learner: E-learning Wonderland will be halted temporarily until 10 February 2025 due to the developer's holiday and internship period. This structured timeline demonstrates a balanced and methodical progression, ensuring that conceptual, analytical, and developmental tasks are appropriately sequenced and resourced to meet the objectives of FYP1 effectively.

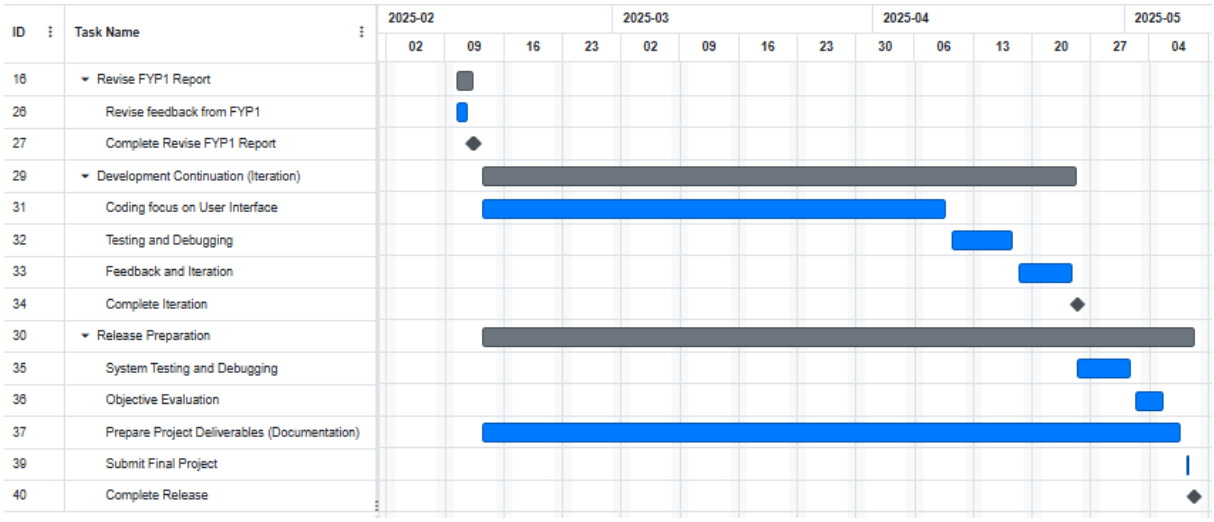


Figure 3.4 FYP 2 Gantt Chart

Figure 3.4 depicts the Gantt chart outlining the project timeline for the Final Year Project (FYP2) semester, spanning from early February 2025 to 9 May 2025. The timeline is divided into distinct phases: report revision, iterative development, and release preparation. Each phase contains specific tasks designed to ensure methodical progress toward project completion.

It begins on 10 February 2025, with the review of the FYP1 report, which will incorporate feedback received on the FYP1 and followed by finalizing the revised document, completed by 12 February 2025. This phase ensures that the project proceeds with a solid conceptual and methodological foundation.

From 13 February to 25 April 2025, the project moves into the continuous Iteration phase, which this long-running phase emphasizes the continuation and enhancement of the project application. From 13 February to 9 April, it focuses on implementing and refining the user interface components, representing the most substantial portion of the development effort. This is followed by Testing and Debugging for 6 days, and then Feedback Integration and Iteration for 5 days, concluding with the Iteration Completion milestone on April 25.

As the process proceeds, the emphasis shifts towards the Release phase from 13 February to 09 May 2025, ensuring the project achieves a professional standard suitable for submission. Documentation Development spans from 13 February to 7 May, running alongside the technical implementation work. After development completion, System Testing and Debugging are allocated 7 days, from 25 April to 1 May, then followed by Objective Evaluation

for 4 days. The project concludes with the Final Project Submission on May 8 and Release Completion on May 9.

The timeline implements parallel workflows to optimize efficiency, with documentation development progressing alongside technical implementation. Time allocation is proportionate to task complexity, with user interface development receiving the most substantial time investment. The concluding week focuses exclusively on evaluation and submission activities, ensuring a clear path to project completion and sufficient time for final quality assurance. This attentive arrangement ensures an appropriate effort distribution across both semesters, conforming to Agile approach concepts while adapting to external restrictions.

3.3 Chapter Summary

This chapter outlines the Agile Methodology used to develop My Little Learner: E-learning Wonderland. Agile was chosen for its flexibility and iterative approach, supporting continuous refinement based on user feedback. The six project phases, which include Concept, Inception, Iteration, Release, Maintenance, and Retirement, guided development. Key activities included defining requirements, designing child-friendly interfaces, incrementally building features, and ensuring quality through testing and documentation. Future phases will focus on maintenance, updates, and eventual retirement to sustain long-term relevance.

Chapter 4

System Concept

This initial phase consists of defining the scope and collecting requirements. As detailed in Chapter 2, comprehensive research has been conducted into kindergarten education and learning psychology to determine the key features and functionalities required for a Kindergarten E-learning Platform, such as engaging lessons, educational games, parental engagement tools, and child progress tracking. Additionally, a questionnaire survey was carried out to gather needs from teachers and parents to determine the required features and functions. Following the requirement analysis, relevant and achievable needs will be identified and incorporated into the project.

4.1 Questionnaire Survey

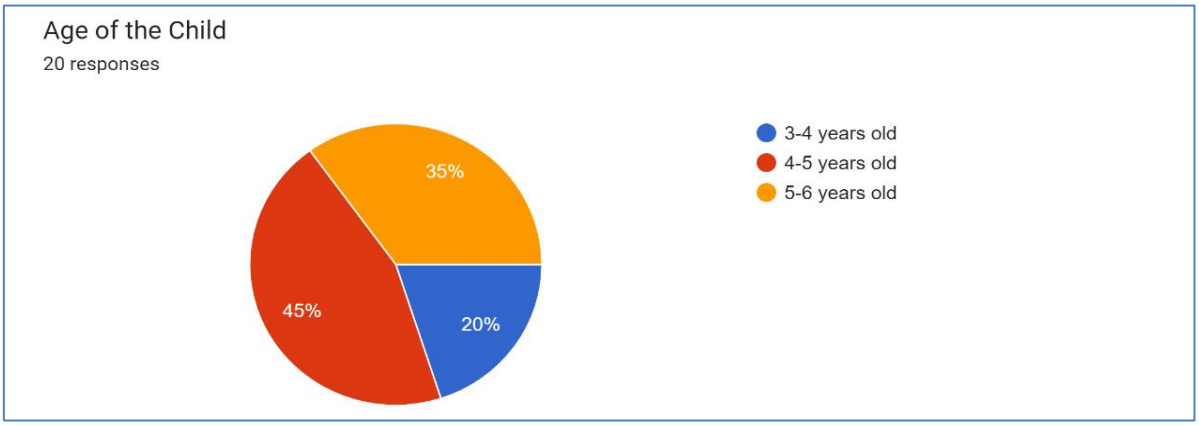


Figure 4.1 Pie Chart of the Age Distribution of The Children

Based on the age distribution displayed in the pie chart in Figure 4.1, 45% of respondents respond that their children are between the ages of four and five, 35% are between the ages of five and six, and 20% are between the ages of three and four. This recommends that the e-learning platform be designed with more focus on children aged four to six, with material and interfaces corresponding to their stages of growth, ensuring engagement and educational efficiency.

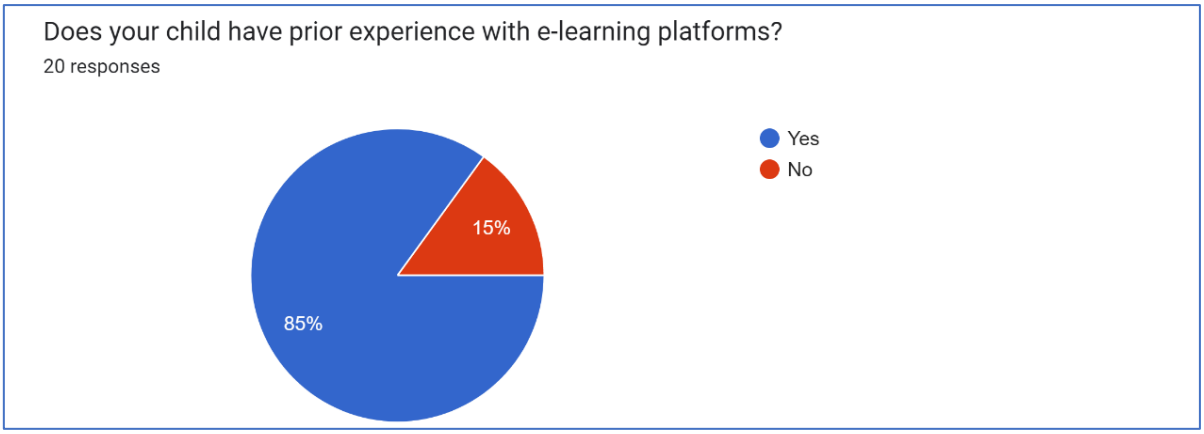


Figure 4.2 Pie Chart of Prior Experience of Children with E-Learning Platforms

The pie chart in Figure 4.2 shows that while 15% of respondents state that their child has no prior experience with e-learning platforms, the remaining 85% have. This means the platform should use users' familiarity with digital learning while offering new features to improve the experience. Providing initial guidelines or tutorials will help newcomers to streamline more smoothly.

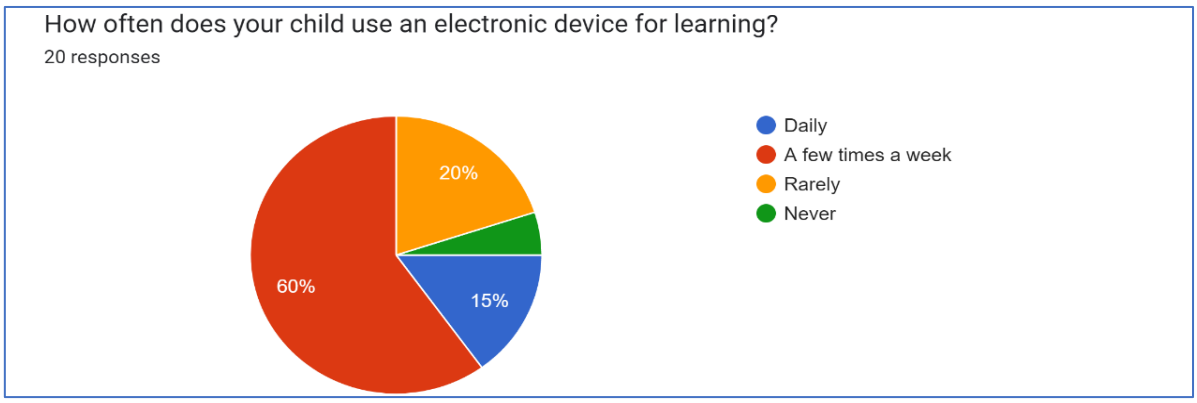


Figure 4.3 Pie Chart of Frequency of Device Use for Learning

The pie chart in Figure 4.3 shows that 60% of respondents use electronic gadgets for studying a few times each week, 20% use them rarely, 15% use them daily, and 5% never use them. This emphasises the necessity for an adaptable and continuously engaging platform with the ability to maintain user interest throughout various interactions. The platform must be dependable and efficient, with minimal technical disruptions that might disrupt the learning process. Furthermore, the different frequency of use highlights the need for features that cater to frequent and infrequent users, such as fresh educational material content, gamification, and user-friendly interfaces. Also, there is a need to integrate reminder notifications that can help

encourage a constant learning journey, while an analytics dashboard is required for effective progress monitoring.

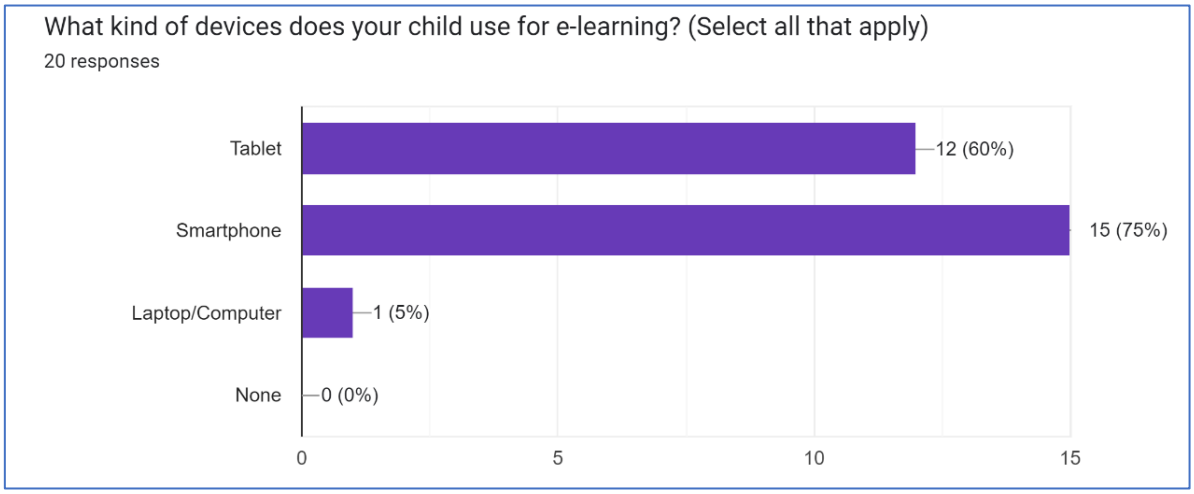


Figure 4.4 Bar Chart of Devices Used for E-Learning

According to the bar chart in Figure 4.4, most respondents (75%) state that their children use smartphones and tablets (60%) for e-learning, while only 5% use laptops or PCs. This emphasises how important it is that the platform be mobile-friendly to guarantee a user interface that is accessible and responsive and works well on a variety of screen sizes. Given the prevalence of mobile device use, features like progress monitoring and analytics should be developed to be easily accessible on smartphones and tablets, allowing parents to monitor their child's learning progress easily. By prioritising mobile devices over desktops, the platform will be optimised to cater to the needs of its core customers and offer a seamless, user-friendly interface that facilitates efficient learning while on the go.

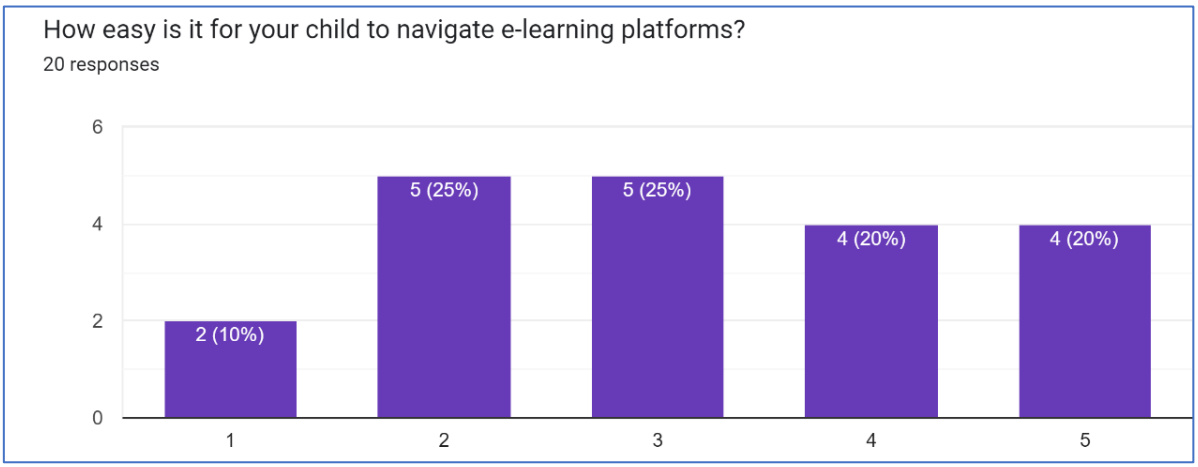


Figure 4.5 Bar Chart of Ease of Navigation of E-learning Platform

The bar chart in Figure 4.5 depicts a variety of responses to navigation ease in an e-learning app for children, with 10% finding it very easy, 25% finding it easy, 25% neutral, 20% finding it challenging, and 20% finding it extremely difficult. These percentages are expressed on a scale of 1 (very easy) to 5 (extremely difficult). These findings underscore the need for improved user interface design, particularly in developing a more straightforward and accessible navigation method for younger users. Although some users find the existing ease of use satisfactory, a sizable portion find the navigation difficult, which may cause frustration and disrupt the learning process. Enhancing the platform's usability will be critical to ensure all users are comfortable using it.

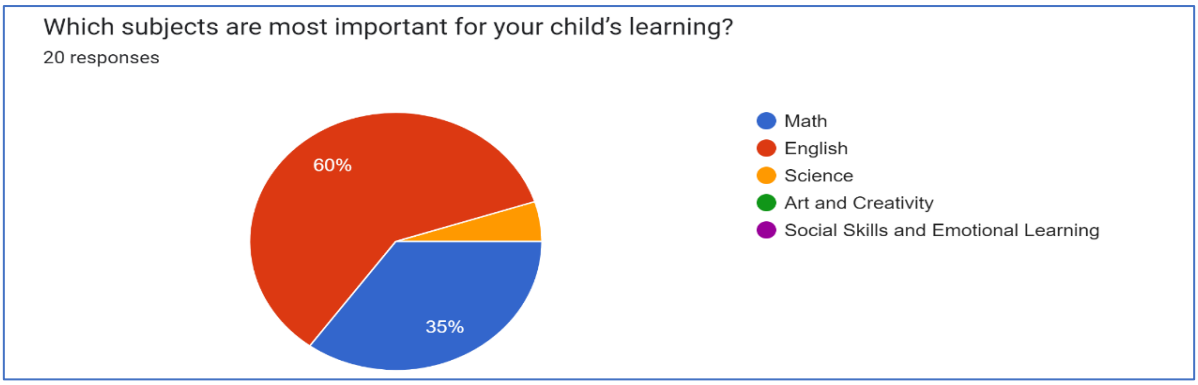


Figure 4.6 Pie Chart of the Most Important Subjects for Children

The pie graph in Figure 4.6 illustrates how respondents rank English and math, with 60% saying English and 35% saying math were the most important subjects. Only a very minority of respondents, 5%, state Science subject is essential. Although incorporating components of other courses could result in a more complete educational experience, the platform's curriculum should be strongly guided by this intense concentration on these critical subjects.

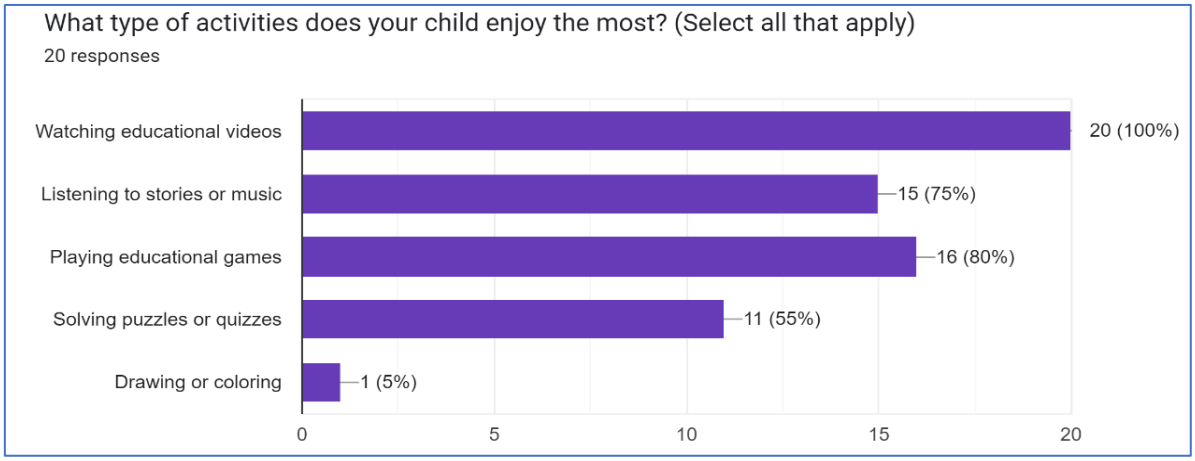


Figure 4.7 Bar Chart of Preferred Learning Activities of Children

The bar graph in Figure 4.7 illustrates the various activities that respondents felt were most enjoyable for kids. Of these, 100% said that watching educational videos was the most satisfying, 80% said that playing educational games was the most effective option, 75% said that listening to stories or music was the best, 55% said that solving puzzles or quizzes was the ideal option, and 5% said that colouring or drawing was enjoyable. Given that participants could select many activities, these findings emphasise the need for a wide variety of features on the platform. The clear preference for interactive games and multimedia content indicates that these features must be incorporated into the platform's designs to increase engagement and improve learning.

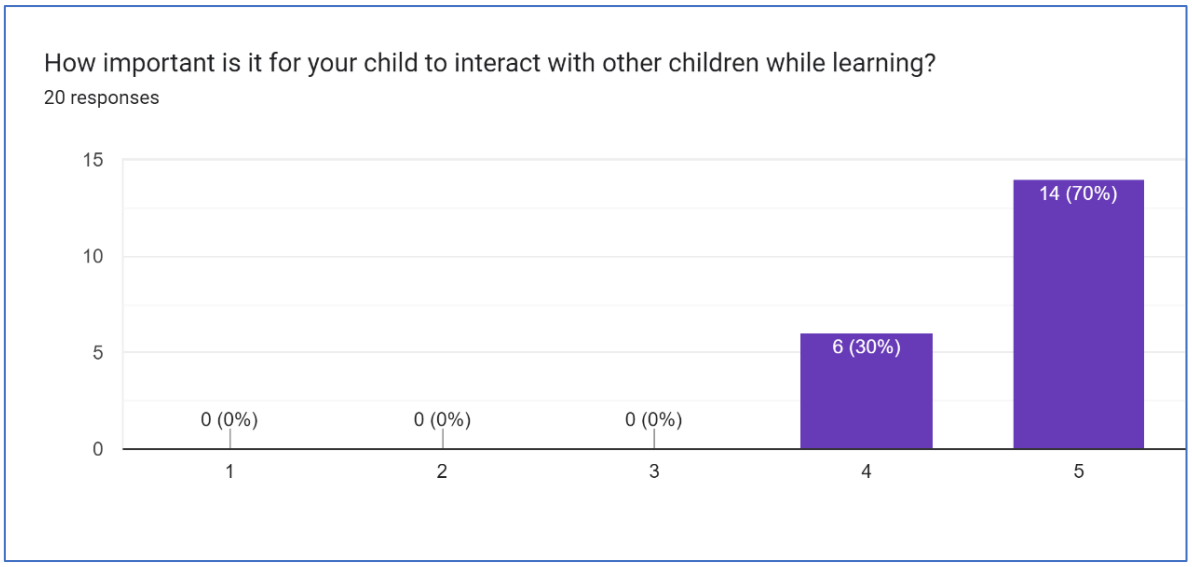


Figure 4.8 Bar Chart of the Importance of Social Interaction

According to the survey results, as shown in Figure 4.8, which used a scale from 1 to 5 (1: Not Important at All, 5: Very Important), most respondents (70%) rated children interacting with others while learning as very important. The remaining 30% rated it as necessary. This strong consensus underscores the critical role that social interaction plays in child development, especially within an educational context. To align with this preference, the platform should incorporate features that promote peer engagement, such as collaborative activities or virtual discussion spaces. These features will not only enhance the educational experience but also contribute to the development of social skills, thereby addressing the holistic needs of children. By integrating these popular activities, the platform could develop a more fun and engaging environment that satisfies kids' diverse interests, encouraging continued involvement and effective learning results.

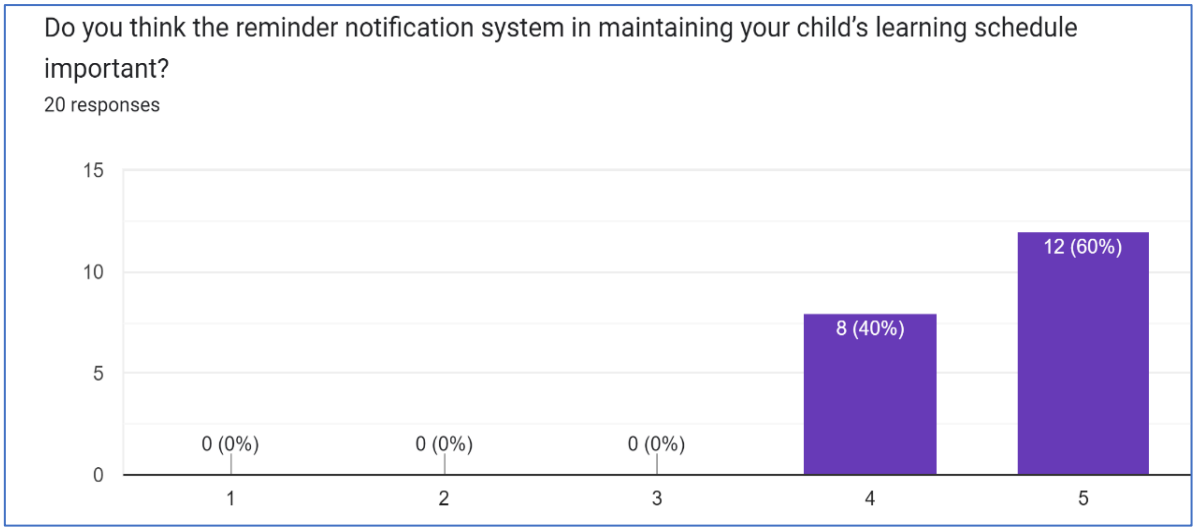


Figure 4.9 Bar Chart of the Importance of Reminder Notifications

According to the survey results in Figure 4.9, 60% of participants think reminder notifications are very important, and 40% believe they are essential. The points on this scale were 1 for not important at all and 5 for very significant. The overwhelming support for reminder alerts emphasises their importance for maintaining a disciplined study routine. Ensuring the platform has a robust reminder system in place will assist in guaranteeing that kids do their educational tasks on time. This feature can potentially significantly increase the effectiveness of the learning process.

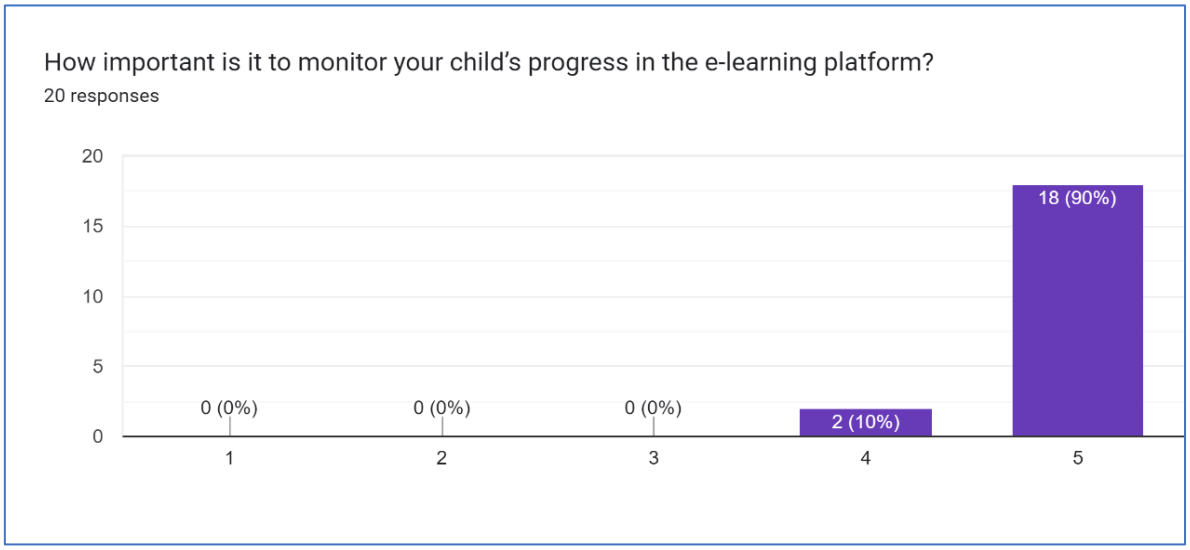


Figure 4.10 Bar Chart of the Importance of Monitoring a Child's Progress

As shown in Figure 4.10, on a scale of 1 to 5, where 5 is Very Important, and 1 is Not Important at All, 90% of respondents said monitoring a child's progress was very important, and the

remaining 10% thought it was necessary. There is a broad consensus regarding the significance of progress monitoring, which emphasises the need to incorporate comprehensive analytics capabilities within the platform. With these tools, parents can monitor their child's educational progress, identify areas of strength and weakness, and offer targeted assistance.

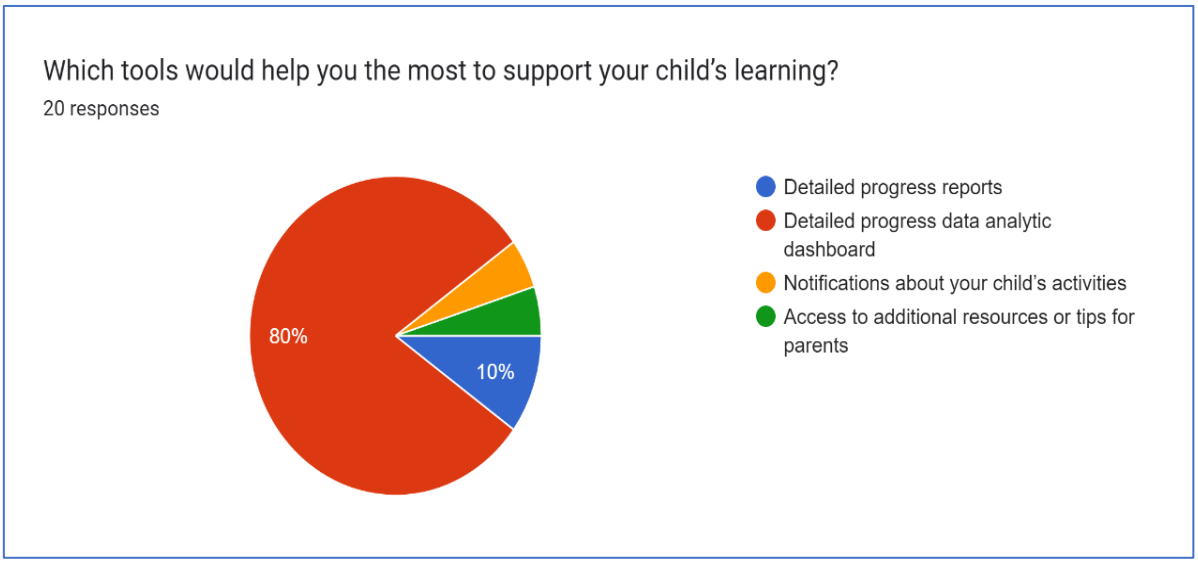


Figure 4.11 Pie Chart of Preferred Support Tools for Learning Progress Monitoring

According to the survey results displayed in Figure 4.11, 80% of respondents believe that a comprehensive progress analytics dashboard is the best tool for assisting their child's learning, followed by detailed progress reports with 10%, and the remaining options with 5% each. This preference for a robust analytics dashboard highlights the application's requirement for such a feature.

4.2 Chapter Summary

This chapter outlined the Concept Phase of the project, which focused on defining the core requirements and validating them through user research. A detailed questionnaire survey was conducted with parents and teachers to gather insights into user needs, preferences, and expectations for a kindergarten e-learning platform. The survey results informed key considerations such as target age groups, preferred learning activities, device usage patterns, and the importance of features like progress tracking and social interaction. Based on these findings, the essential requirements and design directions for the platform were confirmed to ensure alignment with user expectations.

Chapter 5

Project Inception

During this stage, the system architectures, use case diagrams, activity diagrams, block diagrams, and user interface wireframes are created to meet all the criteria, which include the app's layout, functionality, and navigational flow. The emphasis is on developing an interface that is easy to use, suitable for kids, and visually appealing. Planning interactions, animations, and feedback systems inside the app is necessary to ensure a seamless and exciting user experience. It entails creating user journeys and ensuring kindergarten children's simplicity of use. Additionally, a detailed requirements plan is established, covering both the hardware setup and the development tools needed for implementation. This includes specifying devices for testing (such as tablets or smartphones), as well as the selection of appropriate development environments, frameworks, and software tools to support the app's design and functionality.

5.1 System Architecture Diagram

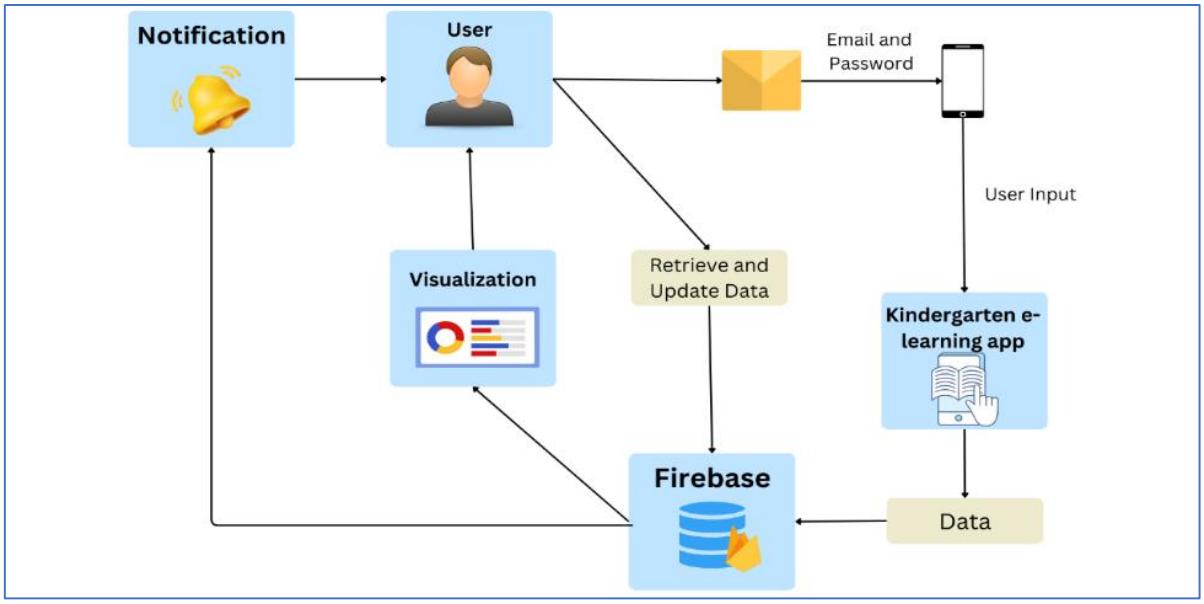


Figure 5.1 Diagram of System Architecture

Figure 5.1 illustrates the system architecture and provides an overview of the complete system, demonstrating how various components interact. It depicts the data flow among the user

interface, the backend database, and other critical elements of the application to deliver an optimal user experience. To access the application, users must first complete an authentication process that requires their email address and password. Users can enter data and interact with learning materials on the kindergarten e-learning interface after authenticating. As users proceed through learning activities, this interface updates new information and retrieves existing data directly from Firebase. The architecture then makes use of this centralized data for two important feedback mechanisms: a notification system that notifies users of pertinent updates, accomplishments, or necessary actions, and a visualization component that converts raw data into understandable charts and graphics for performance monitoring. This cloud-based approach guarantees smooth data synchronization between devices while upholding security and scalability, resulting in a productive learning environment for kindergarteners.

5.2 Use Case Diagram

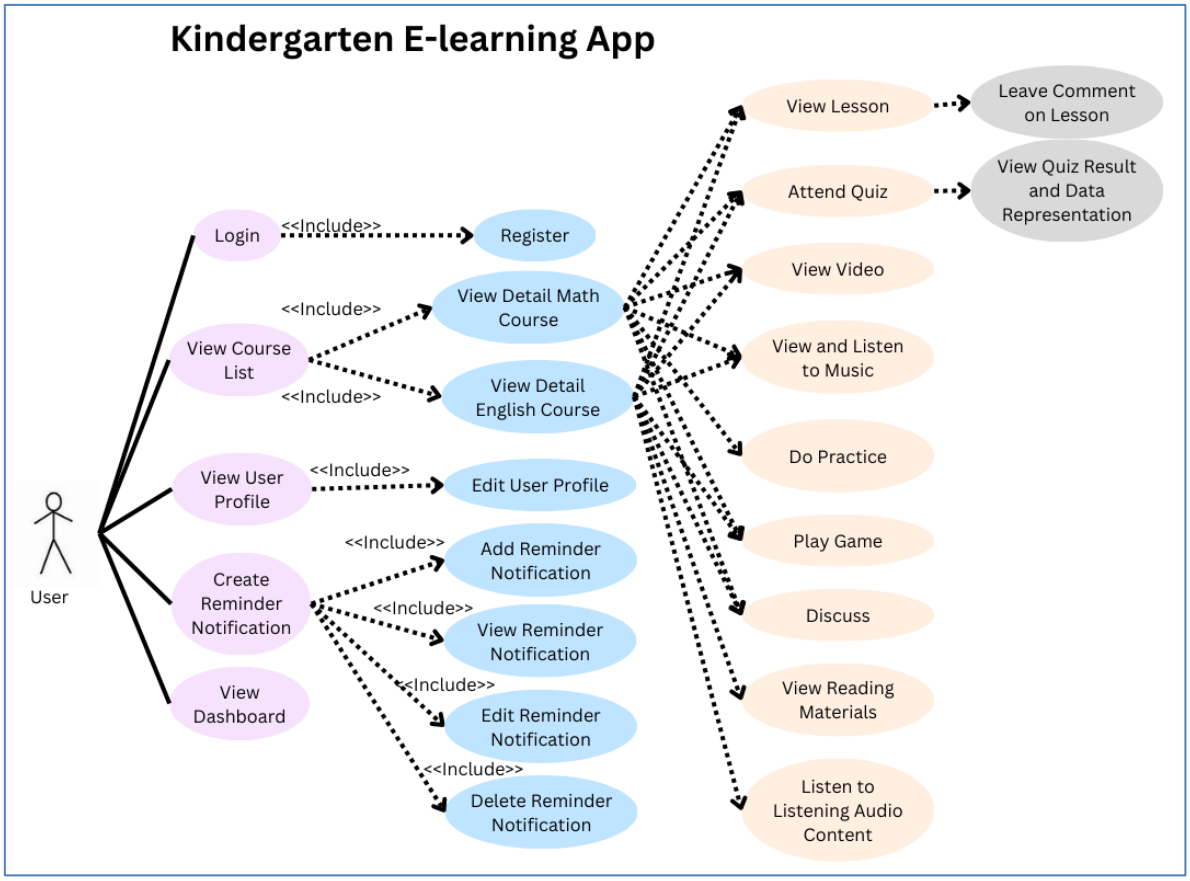


Figure 5.2 Use Case Diagram

Figure 5.2 shows the use case diagram for the kindergarten e-learning app and represents the interactions between the primary actor, the **User** (kindergarten-aged children), and the various functionalities provided by the system. The diagram groups the features into several logical areas, which include Authentication, Course Access, Profile and Reminders, and Learning Activities.

First, in the **Authentication** section, the user can log in, which includes the option to register for an account. Once authenticated, the user gains access to the core functionalities of the app.

In the **Course Access** section, the user can View Course List, which allows them to access details of two specific course categories: View Detail Math Course and View Detail English Course. Both course details unlock access to a variety of Learning Activities, such as View Lesson, Attend Quiz, View Video, View and Listen to Music, Do Practice, Play Game, Discuss, View Reading Materials, and Listen to Audio Content. Some of these activities have extended features; for example, View Lesson allows the user to leave a Comment on the Lesson, and Attend Quiz provides access to View Quiz Result and Data Representation insights to track their quiz score history and progress.

The **Profile and Reminders** section allows users to manage their personal information and reminders. The user can view the User Profile, which includes the option to edit the User Profile. Similarly, the user can create a Reminder Notification, which includes sub-features to add, view, edit, and delete Reminder Notifications. These features support better learning management by helping users track their learning tasks.

Finally, the **View Dashboard** feature allows users to quickly access and monitor an overview of their learning activities and progress within the app.

The use case diagram effectively depicts the app's fundamental features while detailing user-system interactions. It gives a clear and complete overview of the app's design, ensuring that all necessary features are included during the development process.

5.3 Activity Diagram

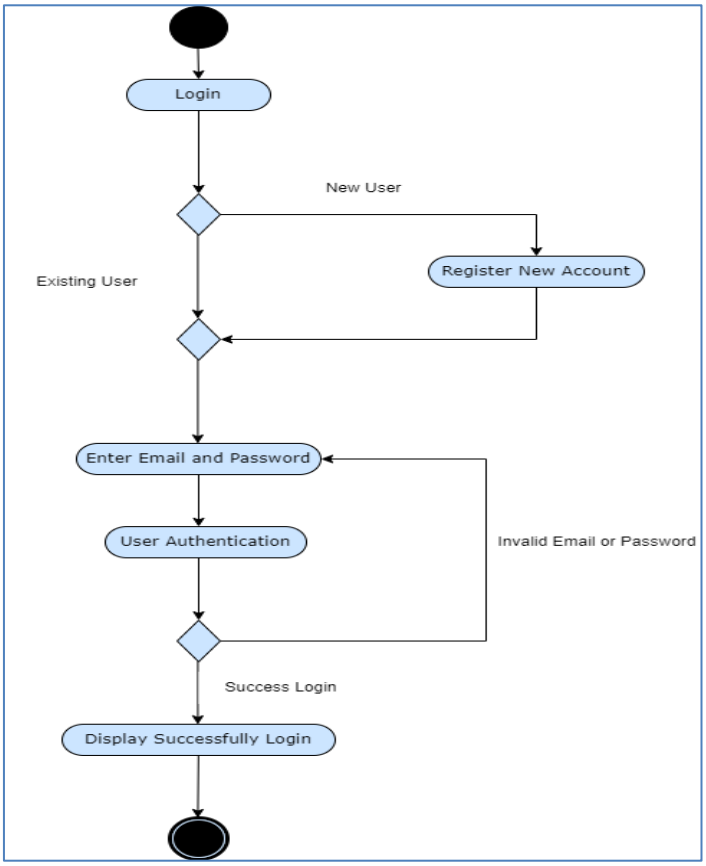


Figure 5.3 Activity Diagram of Register and User Login

Figure 5.3 shows the activity diagram of the register and user login. Users must log in to the system using their email address and password. If the email address or password is incorrect, the system will display an error message and request the user to enter it again. Meanwhile, if the user is new to the app, they can set up a new account by entering their personal information.

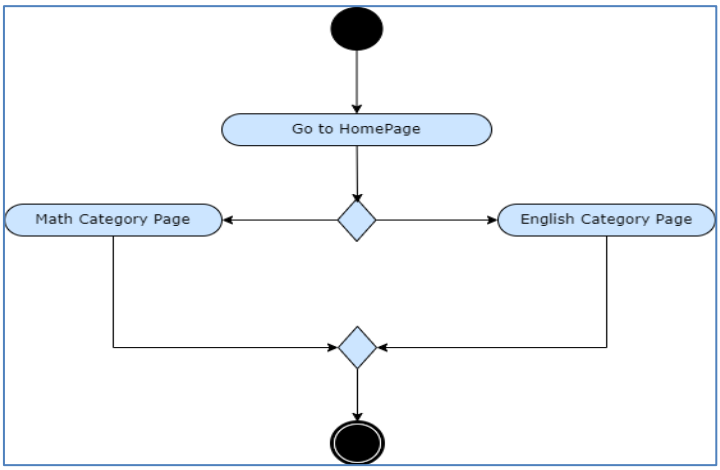


Figure 5.4 Activity Diagram of Homepage

Once the user logs in successfully, they will be directed to the Home Page, which serves as the central hub of the application. Figure 5.4 illustrates the activity flow on the Home Page. From here, the user can navigate to different app sections, specifically the Math Category Page or the English Category Page. The Home Page is designed to be intuitive, making it easy for users, particularly kindergarten children, to choose the desired subject category.

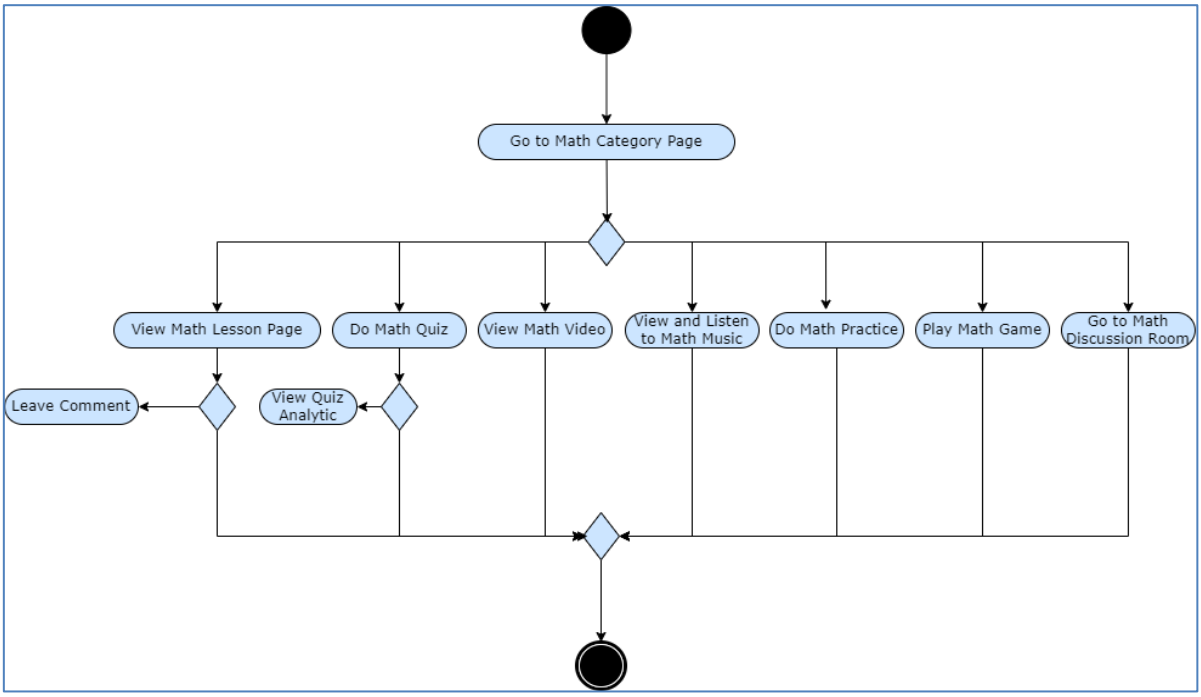


Figure 5.5 Activity Diagram of Math Category Page

Figure 5.5 represents the activity flow on the Math Category Page. Upon selecting the Math Category Page, the user has various options. They can choose to view detailed math lessons and opt to leave comments on lessons. They can take a quiz and view the quiz analytics, including previous scores and data graphs, to track their progress. They can even listen to educational music, watch learning videos, practice, discuss, and play games. The evident branching allows for a smooth user experience, accommodating various learning activities.

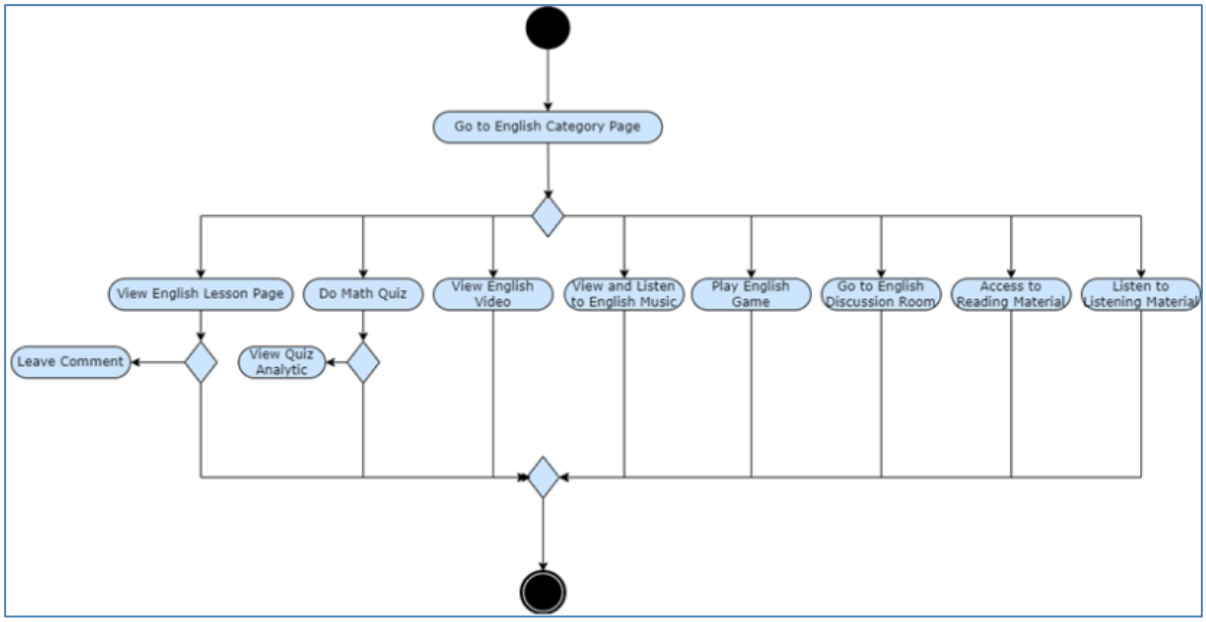


Figure 5.6 Activity Diagram of English Category Page

Figure 5.6 depicts the activity flow on the English Category Page. English Category Page offers users the opportunity to view detailed English lessons, leave comments on lessons, participate in quizzes, view their progress through analytics, listen to educational music, watch videos, have discussions in the collaborative space, play games, access to reading and listening materials. This page is tailored to provide a comprehensive learning experience in English.

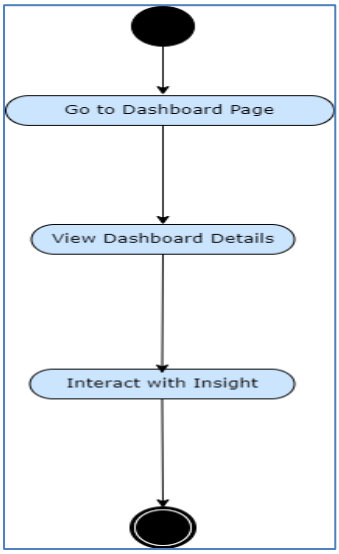


Figure 5.7 Activity Diagram of Dashboard Page

Figure 5.7 presents the activity flow on the Dashboard Page, a central location where users can view their learning progress across different subjects. It visualises quiz results, lesson

completion rates, and other metrics that help users, parents, and administrators monitor learning outcomes.

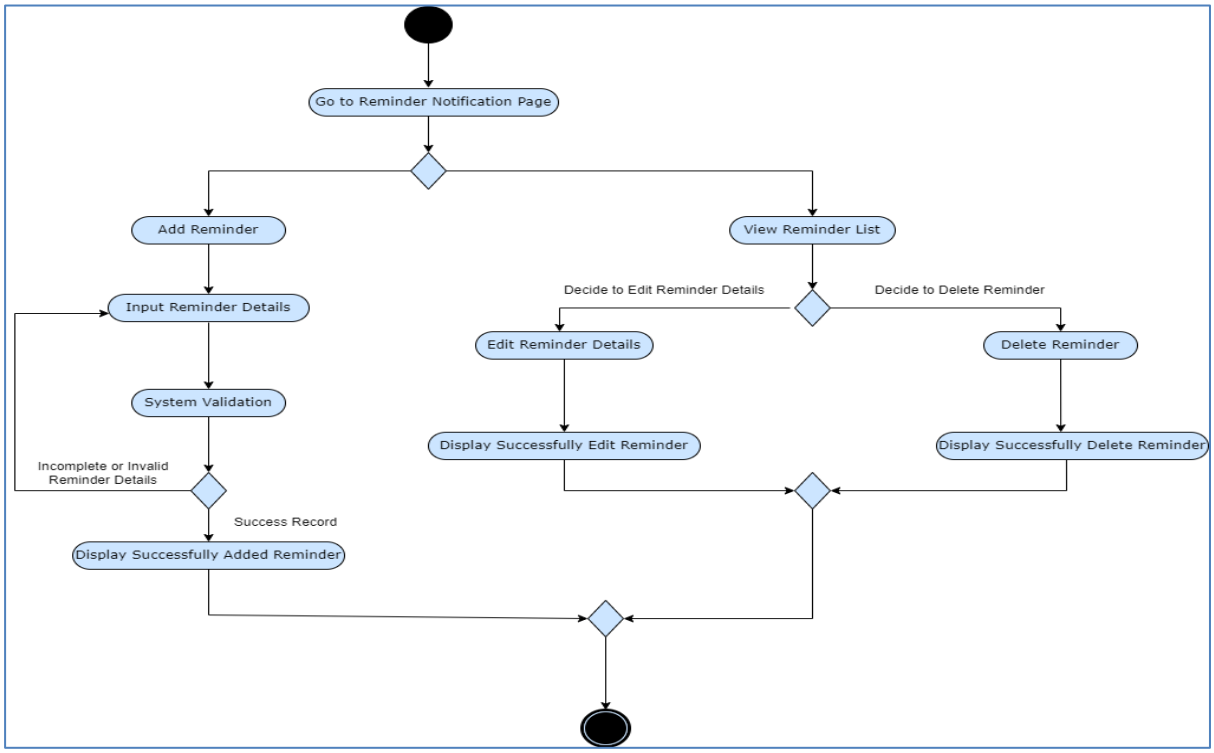


Figure 5.8 Activity Diagram of Reminder Page

Figure 5.8 displays the Reminder Notification Page activity diagram. After clicking on the notification icon in the bottom bar on the main page, the user will be directed to the "Reminder Notification Page". Here, users can view all reminder activities in a calendar format. They can click the date on the calendar to view the reminder on that day and have the option to either edit or delete it. If the user wishes to add a new reminder, they can click the "Add Reminder" icon and enter the necessary information, like time, day, title, etc. After filling out the data, users may click the "Save" button, and the system will check whether the criterion is met. If the information entered by users is incomplete or incorrect, it will prompt the user to re-enter the missing or invalid information. Regardless, if there are no errors during data validation, the system will show a message confirming to the user that the reminder is successfully recorded.

5.4 System Block Diagram

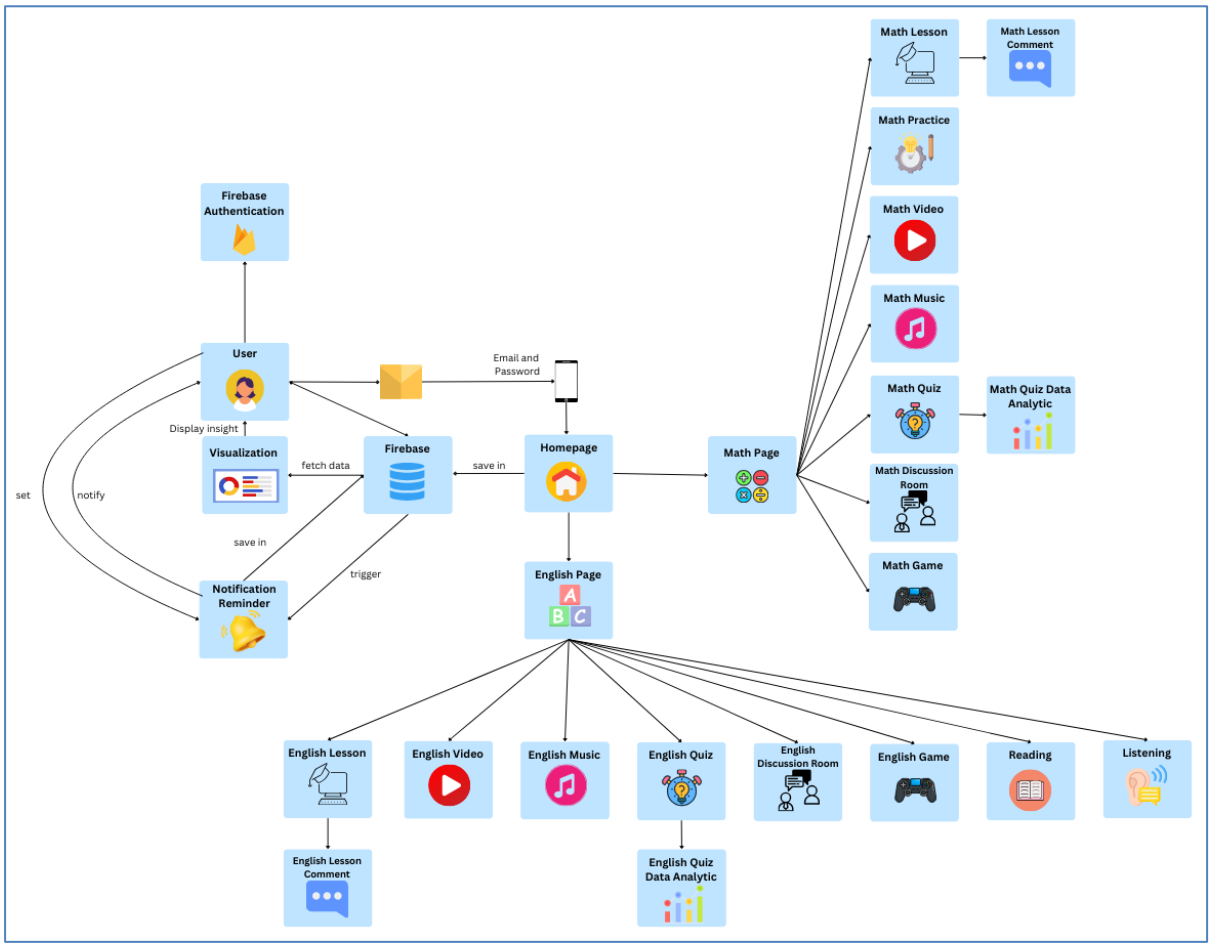


Figure 5.9 Block Diagram

Figure 5.9 displays a block diagram of the kindergarten e-learning software. The module begins with the user interface, through which people interact with the system. This is the app's entrance point, providing users access to its various features over different pages.

The user must authenticate before accessing the system by entering their email address and password using Firebase Authentication. This step guarantees secure access and tailored experiences for users within the app. After successfully logging in, the user can navigate to the Homepage, which offers a simple routing path, allowing users to select the required subject and continue to its dedicated pages.

The Math Page features a variety of learning modules, including Math Lessons, Practice, Videos, Music, Quizzes with Data Analytics, Games, and a Discussion Room. Each module is intended to reinforce mathematical abilities through planned lessons, interactive activities,

instructive films, exciting music, quizzes to assess comprehension, and discussion platforms for peer involvement.

Similarly, the English Page provides many educational resources, including English Lessons, Videos, Music, Quizzes with Data Analytics, Games, Reading Exercises, Listening activities, and an English Discussion Room. These courses aim to improve language proficiency through planned lessons, interactive activities, and interesting multimedia materials.

The application also has a Notification Reminder tool, which allows users to schedule reminders for specific tasks or lessons. These reminders are stored in the Firebase Database and triggered at set times to keep users engaged and on track with their learning objectives. The Dashboard provides a graphical representation of the children's learning progress, revealing strengths and places for improvement based on data obtained from Firebase.

In summary, the kindergarten e-learning app is supported by a robust Firebase backend and provides a secure, comprehensive, and entertaining platform customised to the educational requirements of young students. With its user-friendly UI, subject-specific material, and interactive elements, the app promotes continuous education and growth in math and English.

5.5 System Wireframe

Figure 5.10 Wireframe of Splash Screen Page

Figure 5.10 shows the wireframe of the Splash Screen, which is the introductory page that shows up when the app is launched. It has a refreshing, attractive graphic that is intended to

capture the young learner's attention immediately. A loading sign at the bottom notifies users that the app is loading. The splash screen guarantees a smooth transition into the app while creating the initial impression of the application and strengthening brand identification.

Figure 5.11 Wireframe of Introduction Page

Figure 5.11 depicts the wireframe of the Introductory Page, which consists of two successive displays designed to familiarize users with the program. The initial screen shows an interactive visual, followed by a brief descriptive paragraph explaining the application. The second screen includes an appealing graphic and entertaining material intended to catch users' attention in their learning journey. To proceed, a "Start" button is presented, and a "Skip" option in the top-right corner allows returning users to avoid the introduction entirely.

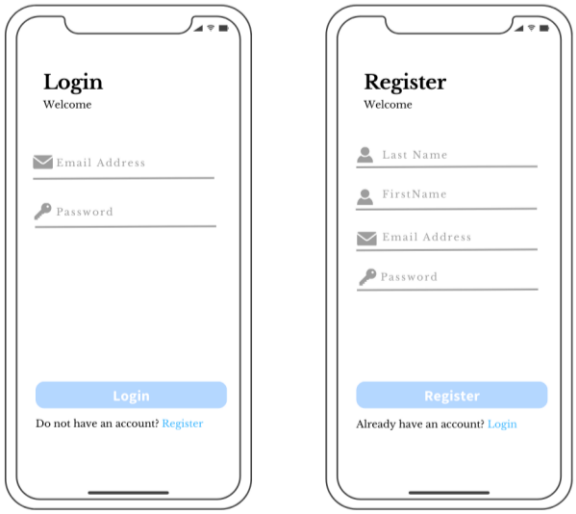


Figure 5.12 Wireframe of Login / Register Page

Figure 5.12 shows the wireframe of the Login and Register Page, which is intended for safe user authentication. The Register Page features input areas for Last Name, First Name, Email Address, and Password, as well as a "Register" button. If a person already has an account, the navigation text link below will take them to the Login page. The Login Page has email and password boxes, a "Login" button, and a text link to the Registration page if necessary. The user-centric design makes it simple and easy for parents and guardians to set up accounts.

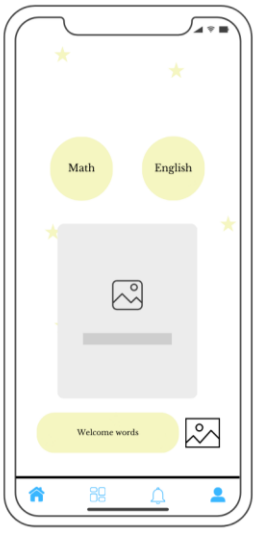


Figure 5.13 Wireframe of Home Page

Figure 5.13 depicts the wireframe for the Home Page, which acts as a key navigation centre. It is intended to feature a vibrant sky-themed background with floating stars and a large school building image to create a joyful, welcome setting. Users may navigate between the Math Category Page and the English Category Page utilizing two primary navigation buttons. A mascot character with a speech bubble shows welcoming messages to boost engagement and friendliness.

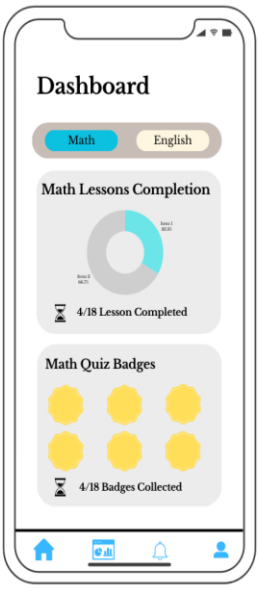


Figure 5.14 Wireframe of Analytic Dashboard Page

Figure 5.14 shows a wireframe for an Analytic Dashboard Page that presents visual illustrations and badge collections to provide the user with an overview of their learning progress. A tab bar at the top allows users to switch between the Math and English dashboards. The dashboard allows parents, educators, and users to easily track accomplishments, areas of strength, and areas for improvement, allowing for data-driven support throughout the child's educational journey.

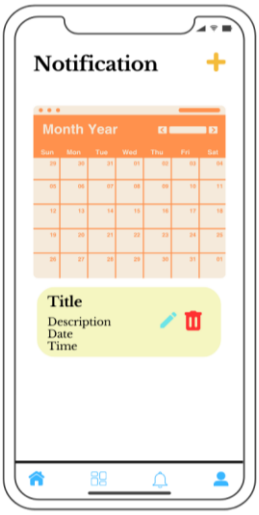


Figure 5.15 Wireframe of Reminder Notification Page

Figure 5.15 displays the wireframe of the Reminder Notification Page, which is meant to help users organize their learning activities. It shows reminders in a calendar view, allowing users

to choose a day to see, change, or delete scheduled activities. The "Add Reminder" option in the top-right corner allows users to create new notifications by inputting information such as time, title, and description, guaranteeing consistent study habits. Then the reminder will be listed below the calendar with an edit and delete icon.

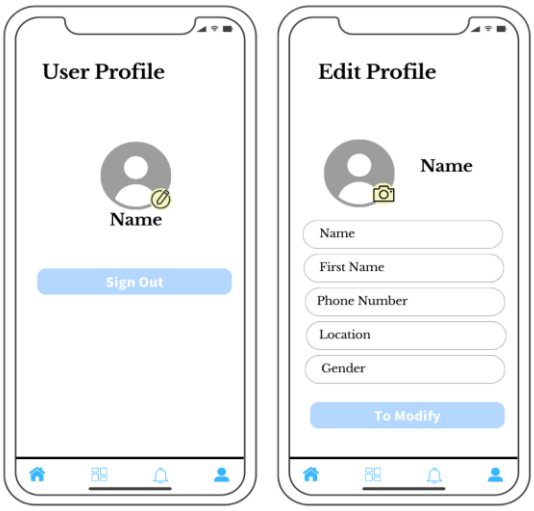


Figure 5.16 Wireframe of User Profile Page and Edit Profile Page

Figure 5.16 displays the wireframe of the User Profile Page and Edit Profile Page. The User Profile Page displays the user's profile information, which includes a profile photo and personal details.

An edit icon next to the profile picture takes users to the Edit Profile Page, where they can update their information and add a new profile photo. The interface encourages individualization and ownership of the learning process.

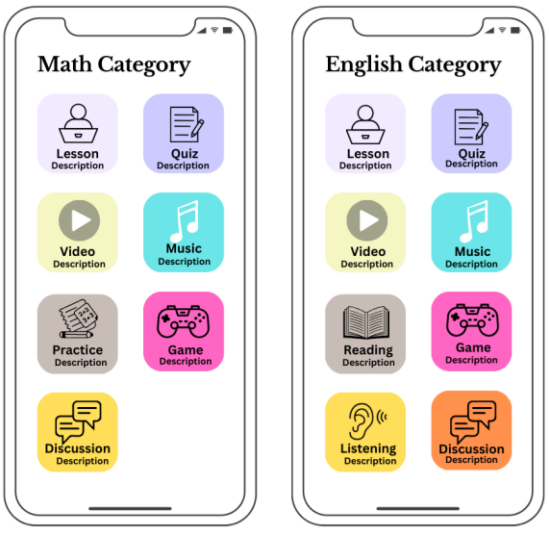


Figure 5.17 Wireframe of Category Page

Figure 5.17 display wireframe of Category Page for both Math and English, which displays learning possibilities in a 2-column, 4-row style with icon buttons and clear titles. This organized and visually appealing design enables young users to simply select different learning activities or sections, supporting natural navigation.

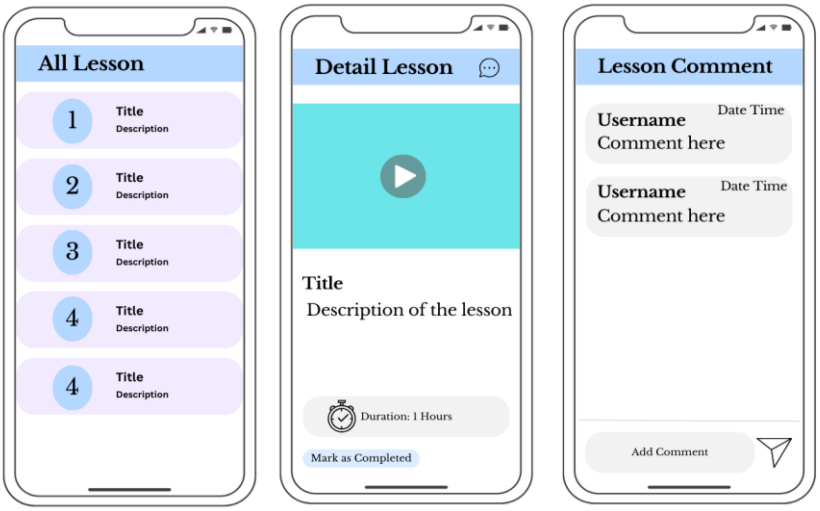


Figure 5.18 Wireframe of Lesson Page, Detail Lesson Page, Lesson Comment Page

Figure 5.18 displays the wireframe of the Lesson Page, Detail Lesson Page, and Lesson Comment Page. The Lesson Page displays available lessons with titles and descriptions in a scrollable manner. When you select a lesson, you'll be sent to the Detail Lesson Page, which includes a video player, lesson title, description, and progress tracker. A chat link in the top-right corner directs viewers to the Lesson Comment Page, where comments can be posted or seen to promote interactive learning and feedback.

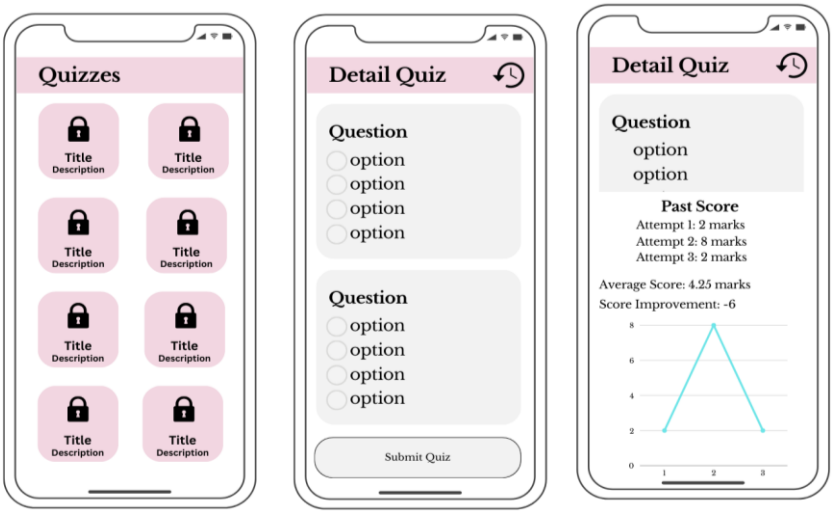


Figure 5.19 Wireframe of Quiz Page, Detail Quiz Page, Quiz Analytic Page

Figure 5.19 shows the wireframe of the Quiz Page, Detail Quiz Page, and Quiz Analytic Page. Quiz Page provides available quizzes, with a lock/unlock effect indicating which are accessible. Tapping a quiz takes you to the Detail Quiz Page, which contains questions and multiple-choice options. A navigation icon directs users to the Quiz Analytics Page, where they can check previous scores and performance graphs, encouraging self-evaluation and motivation.

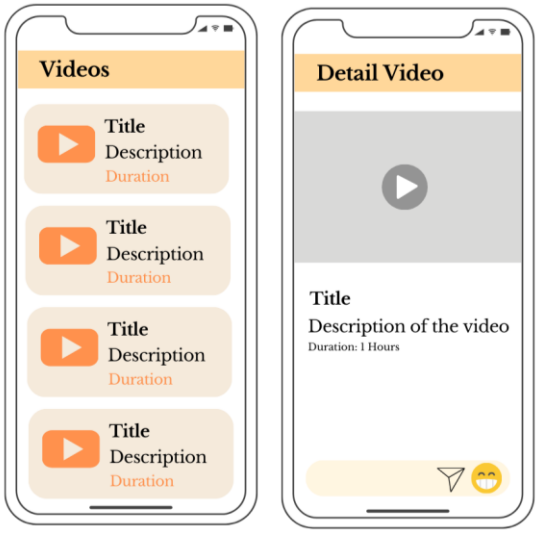


Figure 5.20 Wireframe of Video Page, Detail Video Page

Figure 5.20 displays a wireframe of Video Page, which offers a list of instructive videos, each with a thumbnail image, a title, and a short explanation. When a user picks a video, they are taken to the Detail Video page. This page includes a built-in video player for viewing, as well as the video's title and description underneath. The Detail Video Page also features a real-time comment section and emoji reactions, allowing users to interact while watching the video. This creates a stimulating and socially dynamic learning environment.

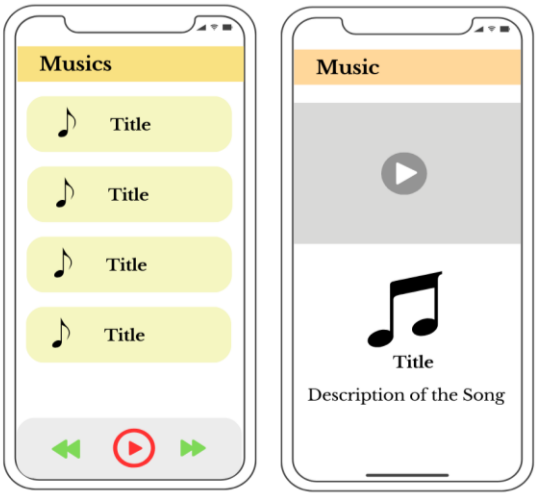


Figure 5.21 Wireframe of Music Page, Detail Music Page

Figure 5.21 shows the wireframe of the Music Page, which has a theme similar to a standard music player interface. Users can find controls for playback at the bottom of the page, including the Play button, Next Song button, and other options. When a song is selected, users are directed to the Detail Music Page, where a video player displays the music video (MV) as well as the song title. This design increases user engagement by merging audio-visual features with interactive music playback.

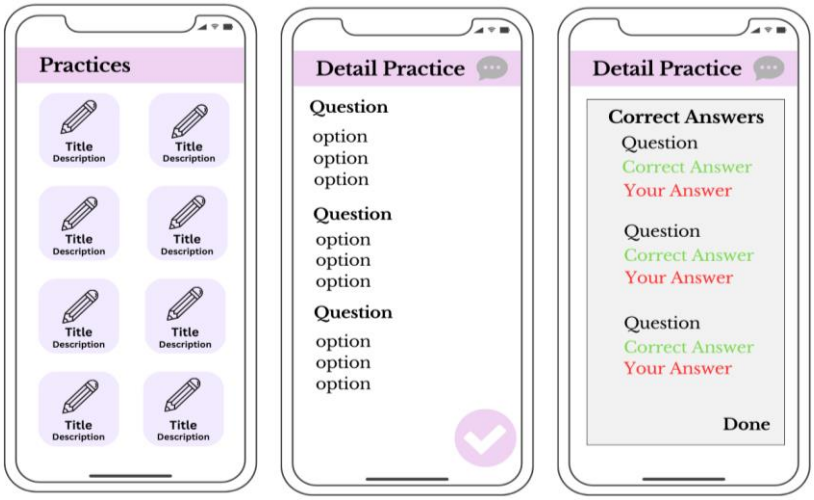


Figure 5.22 Wireframe of Practice Page, Detail Practice Page

Figure 5.22 displays the wireframe of the Practice Page. The Practice Page contains a variety of practice exercises geared toward young learners. Each practice piece is properly labeled to facilitate choosing. Clicking on a practice entry takes the user to the Detail Practice Page, which contains specific exercises and activities. This configuration promotes skill reinforcement and structured practice opportunities to support the learning objectives.

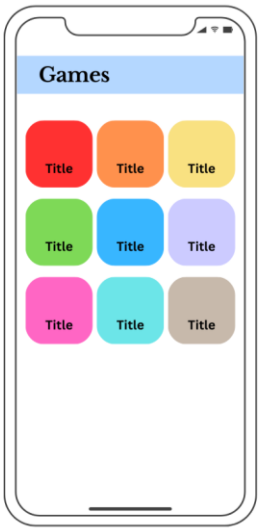


Figure 5.23 Wireframe of Game Page

Figure 5.23 displays a wireframe of the Game Page, which displays all available educational games as icon buttons, with each representing a different game. When a user clicks on a game icon, they are taken to the appropriate game screen, which has its theme. The variety of games fosters entertaining learning experiences, encouraging youngsters to participate through exploration, competition, and reward-driven development.

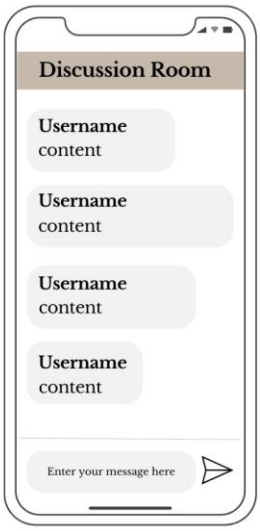


Figure 5.24 Wireframe of Discussion Room

Figure 5.24 depicts the wireframe of the Discussion Room, which is intended to encourage peer-to-peer interactions. Children can participate in monitored discussions or collaborative activities. This social area simulates classroom-like interaction in a virtual environment, which improves communication and collaborative learning.

Figure 5.25 Wireframe of Reading Page

Figure 5.25 displays the wireframe of the Reading Page presents reading materials tailored to the child's level. The Listening Page provides audio-based content to support auditory learning and comprehension. Will show the reading in story book theme, which once click on the story book, will be direct to detail reading page, which will have story title, description, the content, and can adjust the speed button and take quiz button.

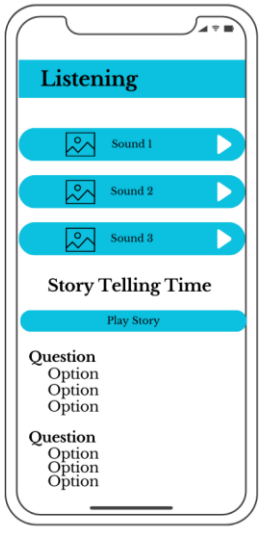


Figure 5.26 Wireframe of Listening Page

Figure 5.26 displays the wireframe of the Listening Page, which presents audio-based learning content in an easy-to-understand visual format. Images of various things or themes function as buttons; when pressed, they play the corresponding audio recordings. Additionally, a special "Storytelling" button is offered, allowing viewers to listen to entire storytelling sessions

without seeing any text. This design encourages auditory learning, improves listening abilities, and makes the experience entertaining and accessible to young children.

5.6 Plan Requirements

During this stage, prioritize features like interactive teaching, parental monitoring systems, or kid progress tracking, and get input from educators and parents. This user-centric approach ensures that the users' needs and feedback are valued and incorporated into the development process.

5.6.1 Hardware Setup

The hardware configuration serves as the foundation for designing and testing the kindergarten's e-learning software. To enable seamless development and extensive testing, this project used a personal computer with appropriate specifications as well as Android mobile devices. The development system ran Windows 10 or later and had at least an Intel Core i5 processor (or comparable), 8 GB of RAM, and 256 GB of SSD storage. These requirements were adequate to operate core development tools like the Flutter SDK, Android Studio, and Visual Studio Code, which effectively supported coding, debugging, and app compilation processes.

Furthermore, Android devices of various screen sizes and hardware capabilities were being used. Testing took place on smartphones running Android 10 or higher, with screen sizes ranging from 6 to 9 inches. Using devices with varying resolutions meant that the app's layout, responsiveness, and performance were optimized across the target audience's preferred platforms. To install and run the app smoothly, mobile devices need at least 4 GB of free storage space, which includes the app installation size of about 3 GB as well as extra space for app data and updates.

This hardware arrangement guaranteed that the software was appropriately created and tested in real-world conditions, resulting in a stable and user-friendly e-learning platform for kindergarten students.

5.6.2 Development Tools

Several development tools are necessary for the completion of this project. **Flutter**, an open-source user interface software development package created by Google, plays a major role in this project. It employs the programming language Dart to create dynamically compiled mobile, desktop, and web applications from a single codebase. It offers a rapid development cycle with a fast reload, an extensive library of pre-designed widgets for constructing beautiful and flexible user interfaces, and the possibility of converting to native code for maximum efficiency. To streamline the development process, **Visual Studio Code** is used as the integrated programming environment that simplifies building, changing, and debugging Flutter code. It includes multiple extensions and connections that boost speed and code quality. For backend infrastructure, **Firebase** is being relied on, as it provides all the resources and services required for the project's backend architecture. It provides user authentication and a Firestore database to ensure efficient data management, authentication, and synchronization, ensuring secure user management and real-time data updates.

5.7 Chapter Summary

This chapter details the inception phase of the kindergarten e-learning app, where the app's design and structure were defined to create an engaging and user-friendly experience for young learners. Key deliverables include system architecture, use case diagrams, activity diagrams, block diagrams, and wireframes.

The system architecture shows how users interact with the app through secure authentication and access learning materials, supported by Firebase for data management and real-time updates. The use case diagram outlines interactions of users with the functionalities, covering Authentication, Course Access, Profile and Reminders, and Learning Activities. Activity diagrams map user journeys through registration, content navigation, and progress tracking.

The block diagram presents the system's core modules, which includes lessons, quizzes, games, and reminders, which are all connected via Firebase services. Wireframes visualize key screens, including the home page, lessons, quizzes, practice, games, reminders, and user profiles, emphasizing clarity, accessibility, and age-appropriate design. Additionally, the chapter outlines the hardware setup and development tools required for the project.

Chapter 6
Development Iterations and Refinements

The iteration phase shifts from ideas and design to actual development. The process begins with converting the finalised concept designs, wireframes, and interface components into functional code. The app's front-end development will focus on visual components, navigation, interactive elements, and any other direct aspects with which users interact. Simultaneously, backend development is ongoing, which includes developing the server-side architecture, databases, and APIs required for the app to run. Backend developers work on the logic that drives the app, handles data, and allows the app to communicate with external services. Finally, all the previously recognised intended features, capabilities, and components are integrated into the app.

The following stage is incremental development, which uses Agile iterations to add and refine features iteratively. This allows for continual improvement and adaptation to the unique needs of young learners and their instructors. In this project, two major iterations were carried out: the first version, as described in Chapter 6.2.1, and the final version, as illustrated in Section 6.2.2. This iteration phase may include five stages, as shown in Chapters 6.1 to 6.5.

6.1 Develop Product

This step focuses on building and implementing the prioritized features identified during the planning stage. An iterative development approach is applied, where each cycle aims to deliver a usable increment of the app. This approach allows for continuous improvement and gradual addition of features, ensuring that each version remains functional and aligned with user expectations.

During this development process, two major buildings were developed to progressively enhance the application's functionality and user interface. The first version (6.2.1) was aimed at creating a functional prototype with key features such as basic navigation, interactive learning modules, and early parental monitoring capabilities. This version laid the foundation for development and early feedback collection. The second version (6.2.2) included

enhancements based on feedback from parents, teachers, and students. This release features updated graphic design, new interactive elements, and optimizations to make the app more engaging, intuitive, and in line with user expectations.

6.1.1 Version 1: Initial Working Build

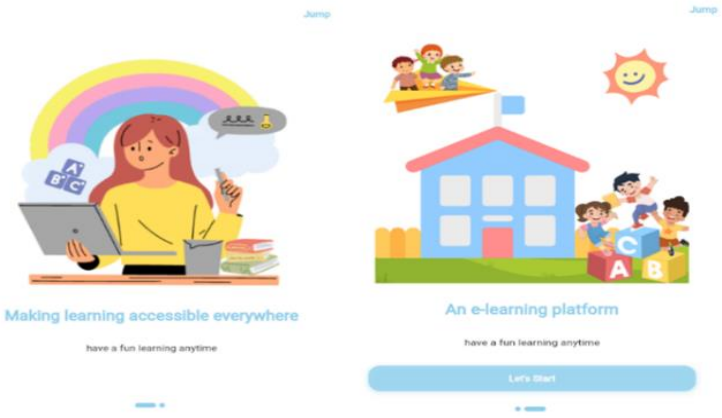


Figure 6.1 Introduction Screen

Figure 6.1 shows the Introduction Screen, which describes the app's intent. Users can either select "Let's Start" to go to the login/registration page or "Jump" to skip the introduction.

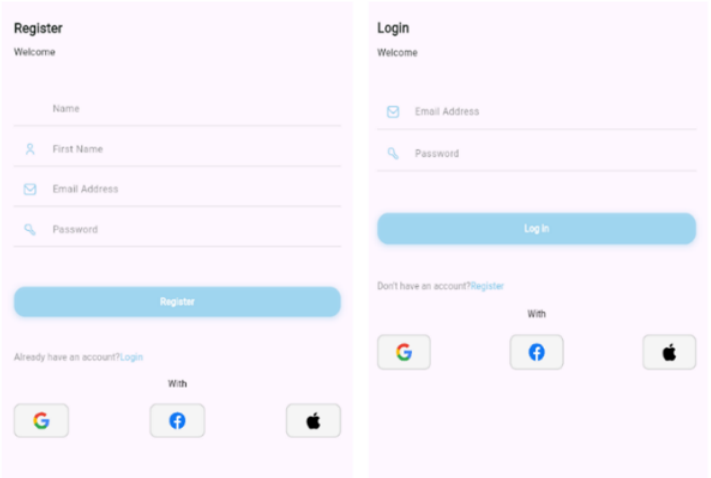


Figure 6.2 Register Page, Login Page

After the introduction, users are directed to the register page as shown in Figure 6.2. Users with an account can click "Login" to access the Login Page. In this version, additional login options are available, including Google, Facebook, and Apple login.

Figure 6.3 Home Page

Upon successful login, users are directed to the Home Page as shown in Figure 6.3, which features animations and interactive elements. The bottom bar navigates the homepage, dashboard, notifications, and profile. Additionally, there are buttons to access the two main courses: Math and English.

Figure 6.4 Math Category Page

Figure 6.4 shows the Math Category Page, which allows users to explore math-related content, including lessons, quizzes, videos, music, practice, games, and a discussion room.

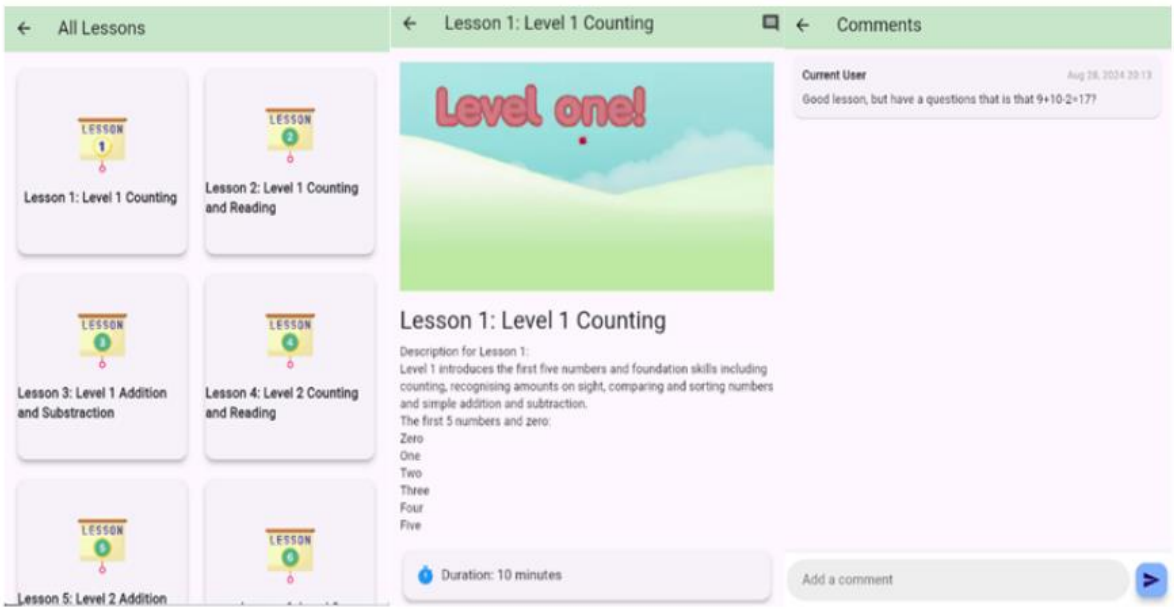


Figure 6.5 Math Lesson Page, Detail Math Lesson Page, Lesson Comment Page

This Figure 6.5 displays the Math Lesson Page, Detail Math Lesson Page, and Lesson Comment Page. Students can access various lessons in the Math Lesson Page. The Detailed Math Lesson Page provides detailed content for specific topics, while the Lesson Comment Page allows students to leave comments and discuss the lessons.

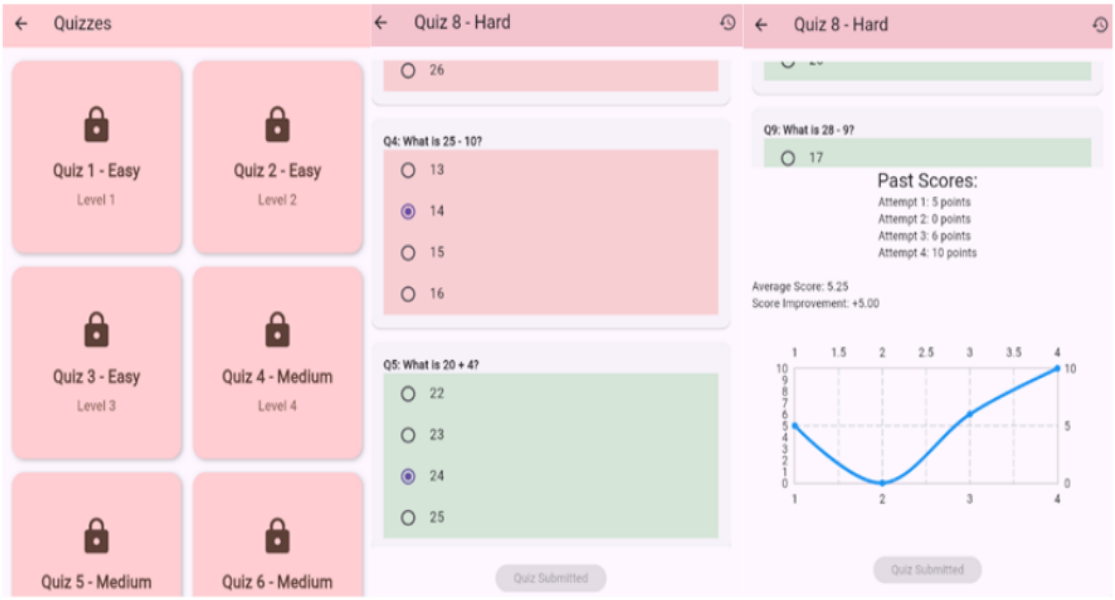


Figure 6.6 Math Quiz Page, Detail Math Quiz Page, Math Quiz Analytic Page

Figure 6.7 Rewards for Quiz Completion

Figure 6.6 shows Math Quiz Page, Detail Math Quiz Page, and Math Quiz Analytic Page, while Figure 6.7 shows Rewards for Quiz Completion. The Math Quiz Page presents quizzes related to the math lessons. The Detailed Math Quiz Page allows students to view and answer quiz questions. Students are shown animated rewards based on their scores after completing a quiz. The system highlights correct answers in green and incorrect ones in red. Additionally, students can click the history button to view detailed analytics of their quiz performance. The Math Quiz Analytic Page offers insights into quiz performance, including past attempt scores, improvement metrics, average scores, and graphical representations of quiz attempts.

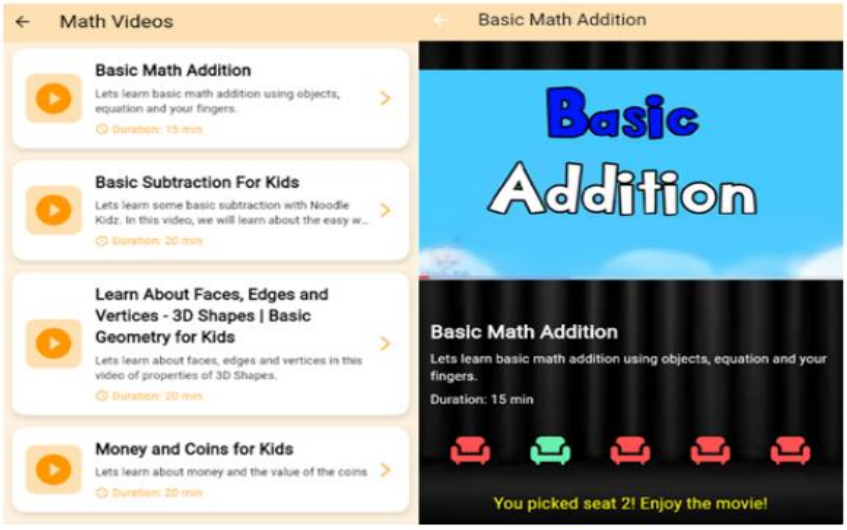


Figure 6.8 Math Video Page, Detailed Math Video Page

Figure 6.8 showcases the Math Video Page and Detail Math Video Page. The Math Video Page displays a series of educational videos. The Detailed Math Video Page enhances the interactive experience by allowing students to choose seats in a cinema-themed environment, making learning more engaging.

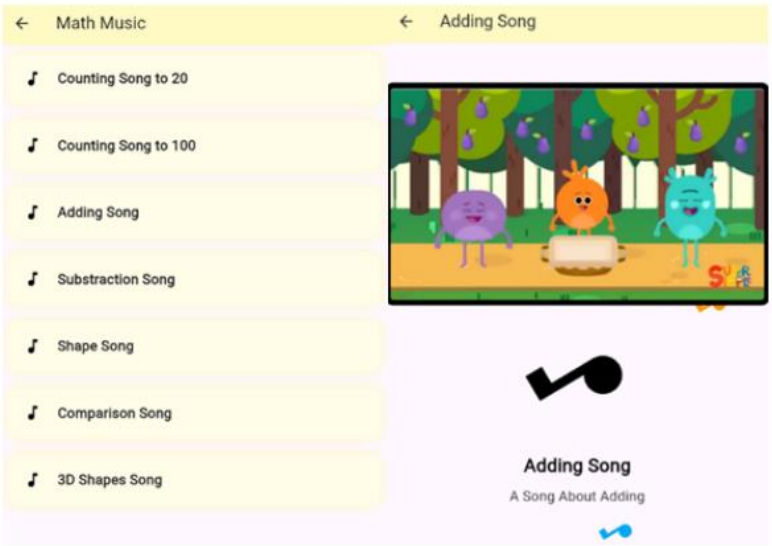


Figure 6.9 Math Music Page, Detail Math Music Page

Figure 6.9 shows Math Music Page and Detail Math Music Page. The Math Music Page features educational songs related to math concepts, with content created specifically for the platform. The Detailed Math Music Page provides additional features, like lyrics and interactive elements, to help students learn through music.

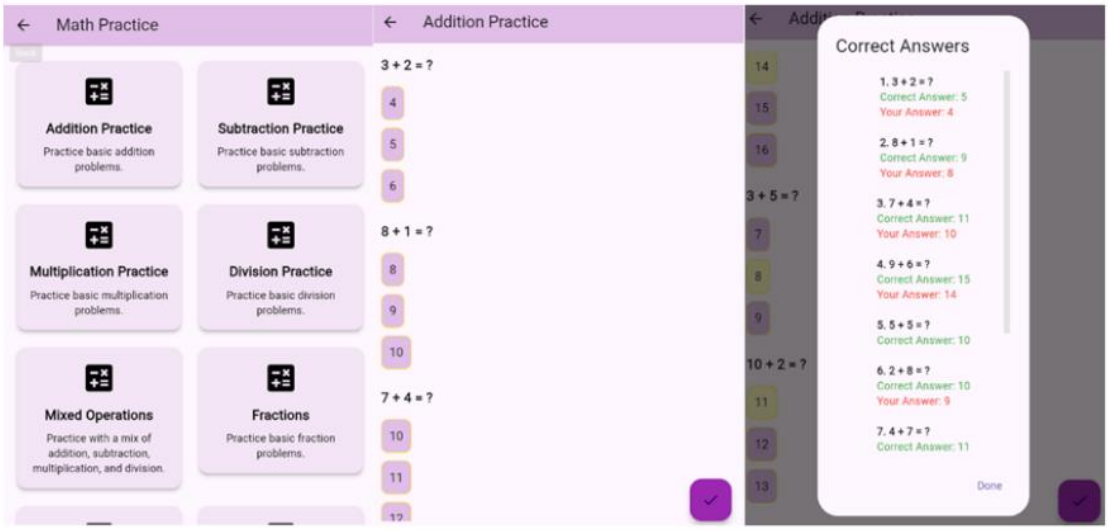


Figure 6.10 Math Practice Page, Detailed Math Practice Page

Figure 6.10 shows the Math Practice Page and the Detail Math Practice Page. The Math Practice Page offers exercises for students to practice math problems. The Detailed Math Practice Page shows the correct answers after submission, helping students learn from their mistakes.

Figure 6.11 Math Discussion Room

The figure 6.11 display Math Discussion Room, allows students to engage in discussions related to math topics, facilitating peer learning and collaboration.

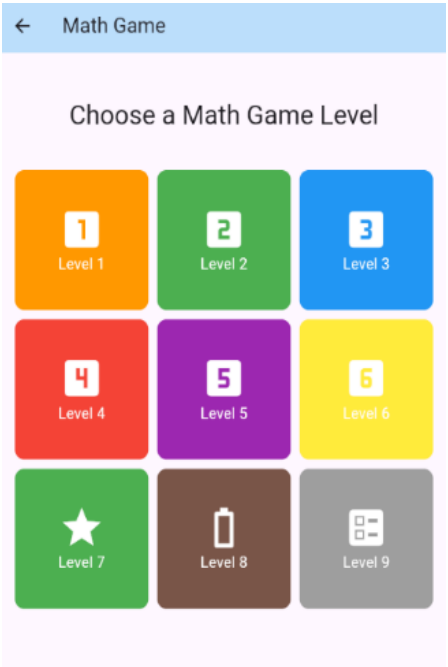


Figure 6.12 Math Game Page

Figure 6.12 display Math Game Page offers various educational games. The Detailed Math Game Page provides instructions and interactive gameplay designed to reinforce math concepts in a fun and engaging way.

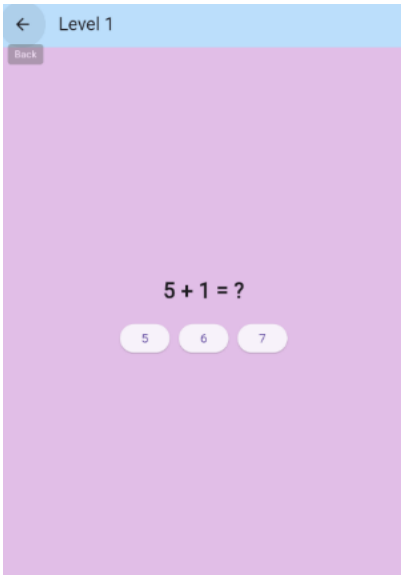


Figure 6.13 Basic Arithmetic Game Page

Figure 6.13 shows the Basic Arithmetic Game Page, which is designed to assist youngsters learn basic arithmetic (addition, subtraction, and multiplication). The interactive interface includes bright buttons and animations, making learning more engaging and enjoyable. As youngsters answer more difficult problems, they acquire confidence in their math abilities.

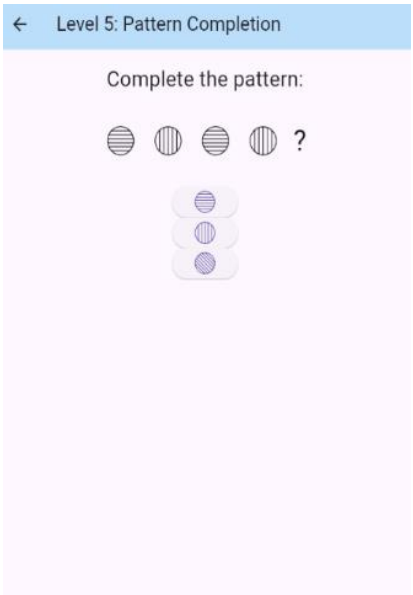


Figure 6.14 Pattern Recognition Game Page

Figure 6.14 shows the pattern recognition game page, which trains youngsters' pattern identification skills through interactive, graphically appealing exercises.

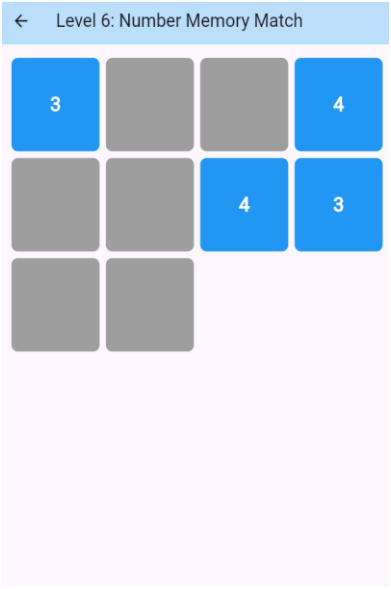


Figure 6.15 Number Memory Match Game Page

Figure 6.15 illustrates the Number Memory Match Game Page, which allows young children to flip cards and match pairs of numbers, thereby improving their memory and number recognition skills.

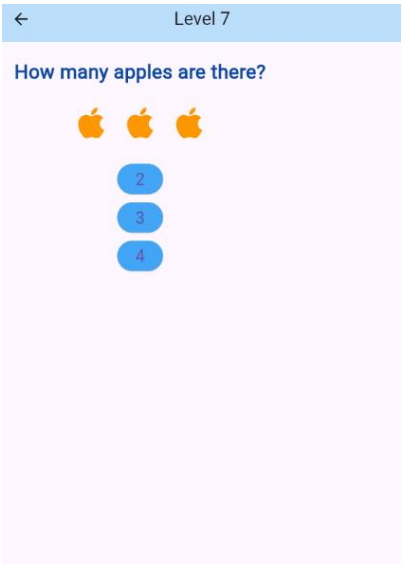


Figure 6.16 Counting Game Page

Figure 6.16 depicts the Counting Game Page, where kids count objects and choose the correct answer from a list of options, thus reinforcing their counting skills.

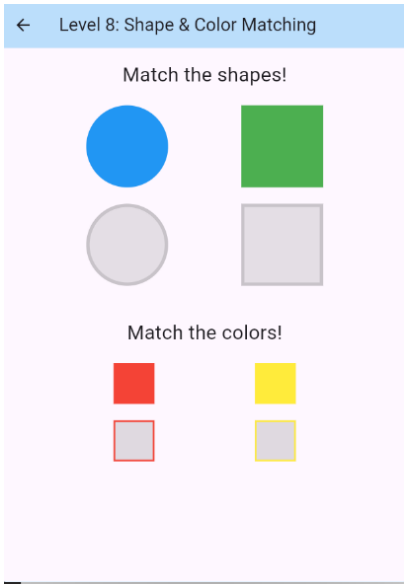


Figure 6.17 Shape and Colour Matching Game Page

Figure 6.17 depicts the Shape and Colour Matching Game Page, a game in which forms and colours are matched to help develop visual differentiation and cognitive skills.

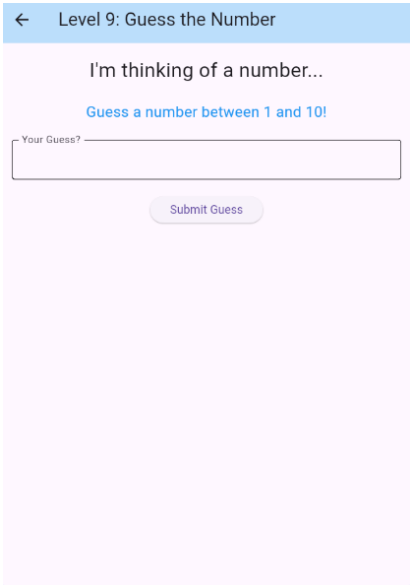


Figure 6.18 Number Guessing Game Page

Figure 6.18 depicts the Number Guessing Game Page, which includes a number guessing game in which a number is predicted and the game provides feedback indicating whether the guess is more than, less than, or right.

Figure 6.19 English Category Page

Figure 6.19 shows English Category Page, allows users to explore english -related content, including lessons, quizzes, videos, music, reading, listening, games and discussion room.

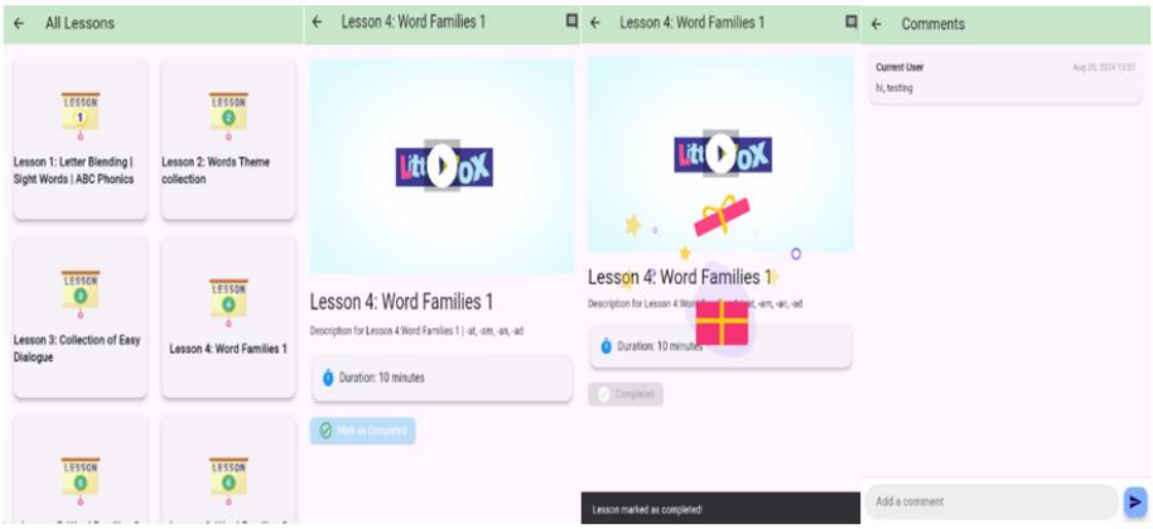


Figure 6.20 English Lesson Page, English Math Lesson Page, Lesson Comment Page

Figure 6.20 shows the English Lesson Page, English Math Lesson Page, and Lesson Comment Page. The English Lesson Page provides access to various lessons focused on language skills. When a lesson is marked as completed, students receive a virtual prize as encouragement. The Detailed English Lesson Page delves into specific lesson content, while the Lesson Comment Page allows students to engage in discussions, sharing thoughts and feedback on the lessons.

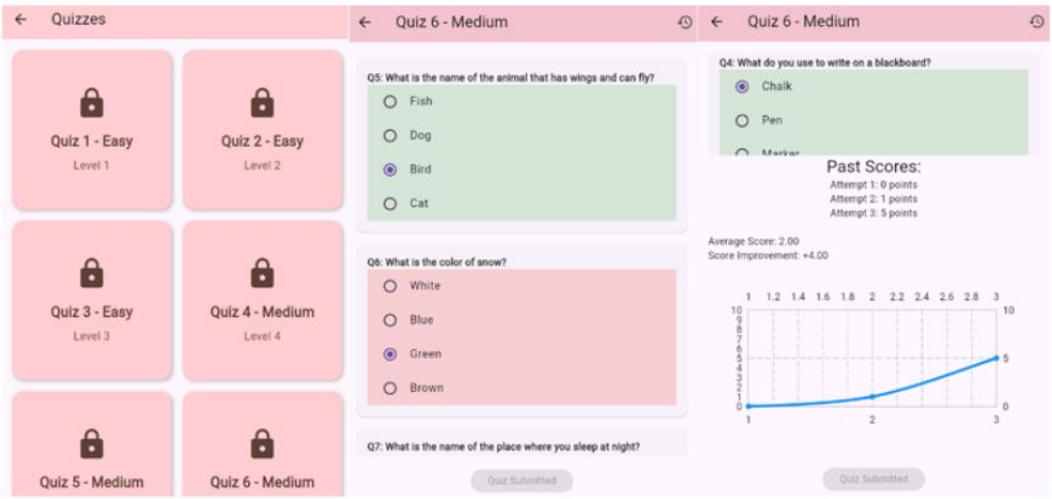


Figure 6.21 English Quiz Page, Detailed English Quiz Page, English Quiz Analytic Page

Figure 6.21 depicts the English Quiz Page, the Detail English Quiz Page, and the English Quiz Analytic Page. This English Quiz Page is the page where students can test their knowledge through quizzes. The Detailed English Quiz Page features individual quiz questions, and the English Quiz Analytic Page offers detailed analysis of quiz performance, including metrics such as past scores, improvement trends, and graphical representations of progress.

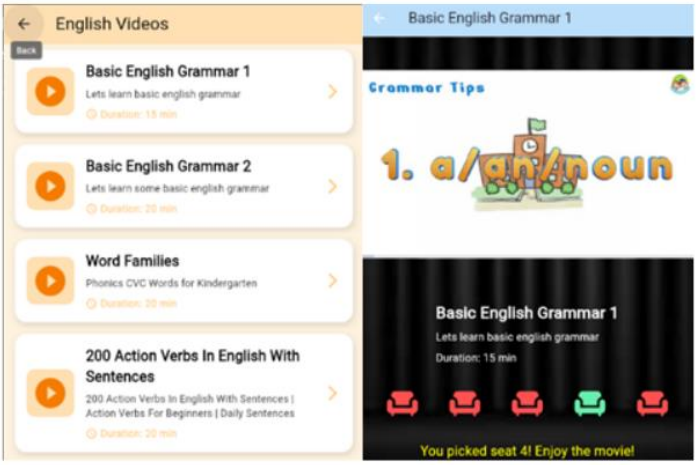


Figure 6.22 English Video Page, Detailed English Video Page

Figure 6.22 shows English Video Page, Detail English Video Page. The English Video Page lists educational videos tailored to enhance language learning. The Detailed English Video Page offers an immersive viewing experience with interactive elements that make learning more engaging.

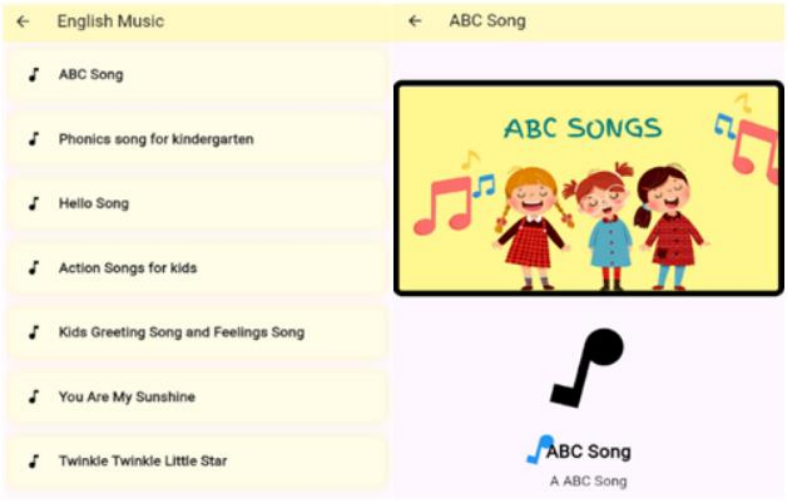


Figure 6.23 English Music Page, Detailed English Music Page

Figure 6.23 shows the English Music Page, which introduces songs that help students learn language concepts through music.

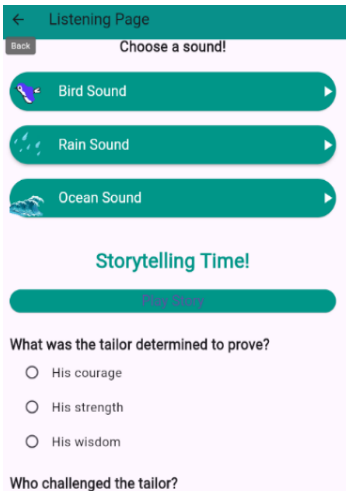


Figure 6.24 English Listening Page

Figure 6.24 shows the English Listening Page, which allows students to listen to different sounds, stories, and other auditory content. After listening, students can take quizzes based on the stories they heard, helping to improve their listening and comprehension skills.

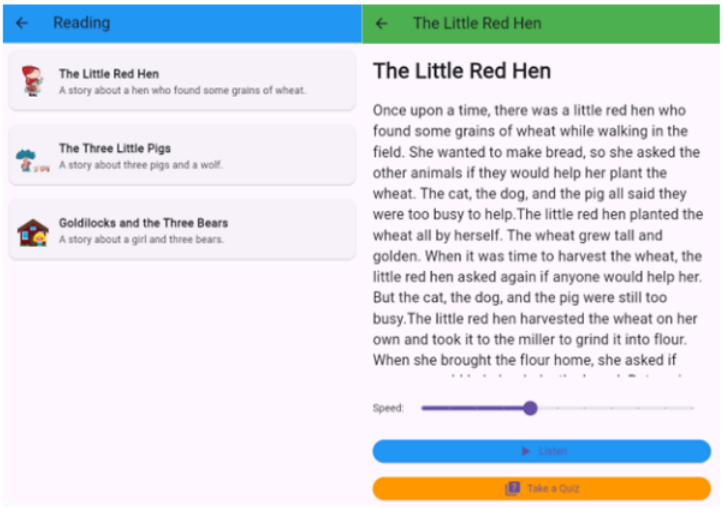


Figure 6.25 English Reading Page, Detail Reading Page

Figure 6.25 shows the English Reading Page and, Detail Reading Page. The English Reading Page lets students choose stories to read. The Detailed Reading Page includes features such as adjustable speech speed and quizzes based on the story's content, promoting reading comprehension and fluency.

Figure 6.26 English Discussion Room

The figure 6.26 shows English Discussion Room, which provides a platform for students to discuss various language topics, facilitating collaborative learning and peer interaction.

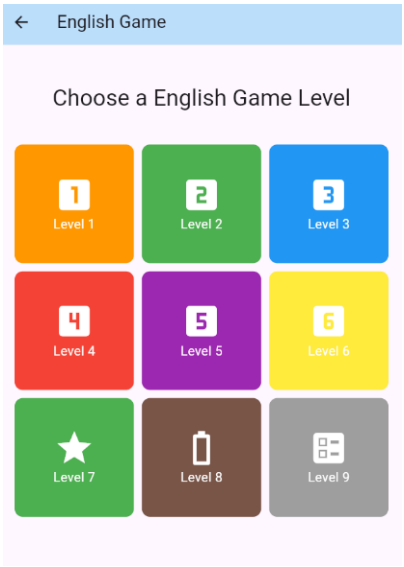


Figure 6.27 English Game Page, Detailed English Game Page

Figure 6.27 shows English Game Page offers various educational games at different difficulty levels. The Detailed Math English Page provides instructions and interactive gameplay designed to reinforce math concepts in a fun and engaging way.

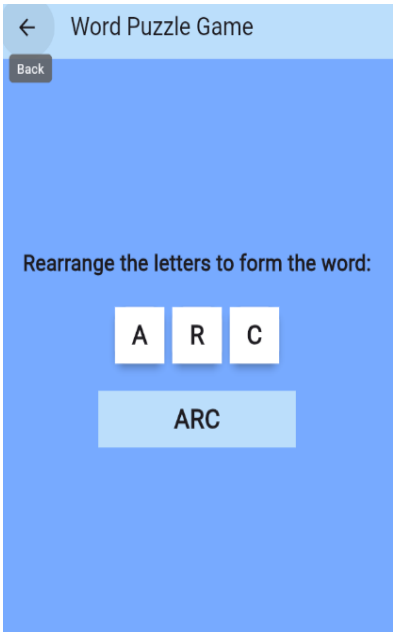


Figure 6.28 Word Puzzle Game Page

Figure 6.28 depicts the Word Puzzle Game Page, which arranges letters to form words to help students strengthen their spelling and vocabulary skills.

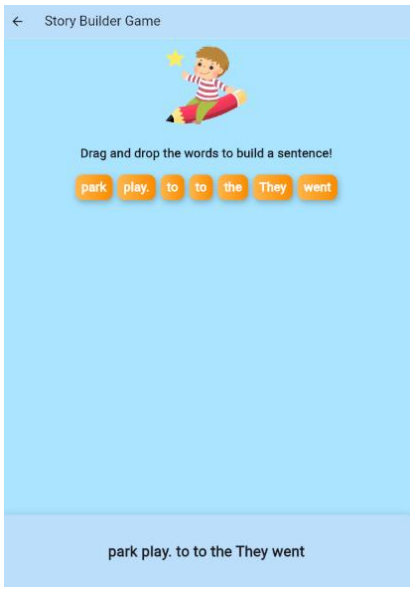


Figure 6.29 Sentence Builder Game Page

Figure 6.29 shows the Sentence Builder Game Page, where words are arranged to form a complete sentence, helping to improve sentence structure and language skills.

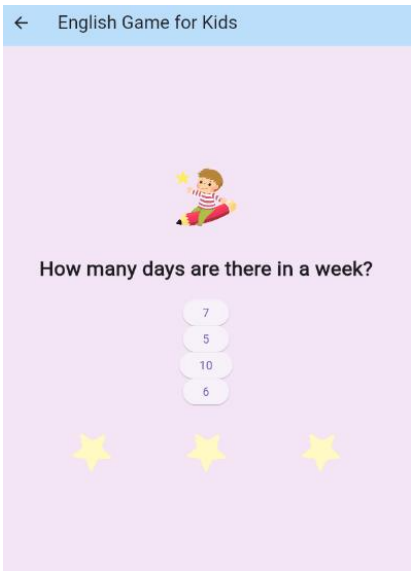


Figure 6.30 Daily Trivia Game Page

Figure 6.30 shows the Daily Trivia Game Page, where users answer a variety of daily questions, designed to enhance their general knowledge and language skills.

Figure 6.31 Word Matching Game Page

Figure 6.31 shows the Word Matching Game Page, where images are matched to their corresponding words, helping to improve vocabulary and word-image association skills.

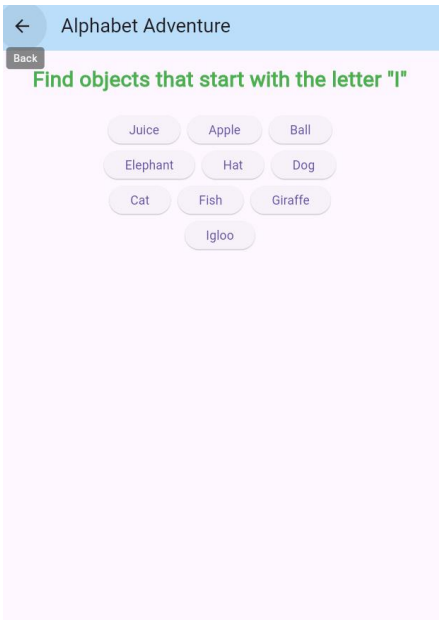


Figure 6.32 Alphabet Exploration Game Page

Figure 6.32 shows the Alphabet Exploration Game Page, where users select objects from a list of options that begin with a specific letter, helping to reinforce letter recognition and vocabulary skills.

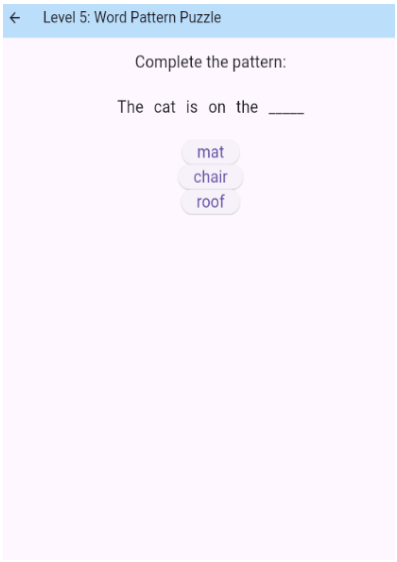


Figure 6.33 Complete Sentence Game Page

Figure 6.33 shows the Complete Sentence Game Page, where users choose the most suitable words from options to form a complete and correct sentence, helping to improve sentence structure and language skills.

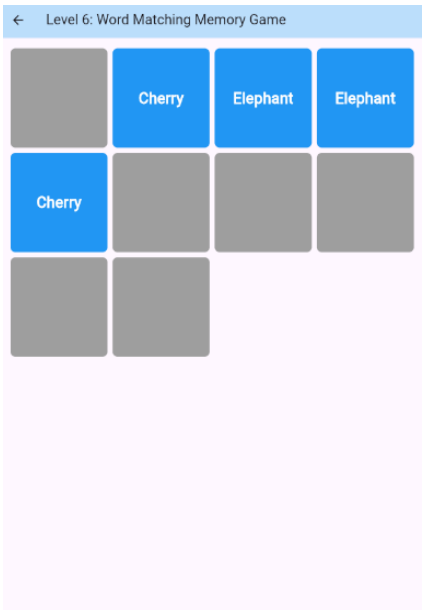


Figure 6.34 Word Matching Memory Game

Figure 6.34 shows the Word Matching Memory Game, where users match two identical word cards by remembering the previously flipped cards, helping to enhance memory and word recognition skills.

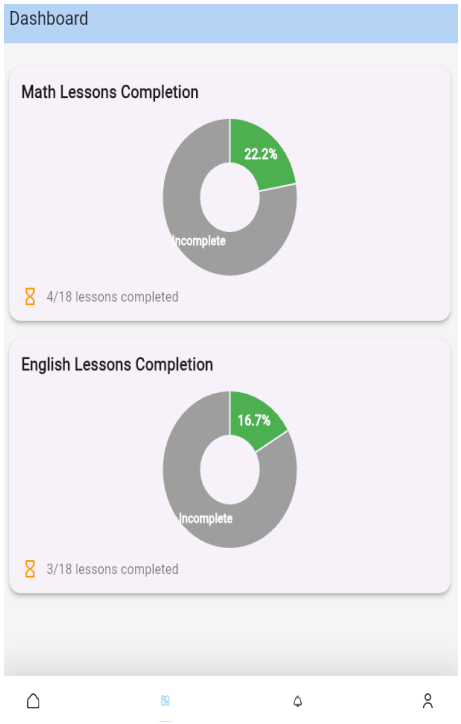


Figure 6.35 Dashboard Page

Figure 6.35 shows the Dashboard Page, which displays the progress of lessons in both Math and English subjects, represented graphically for easy tracking.

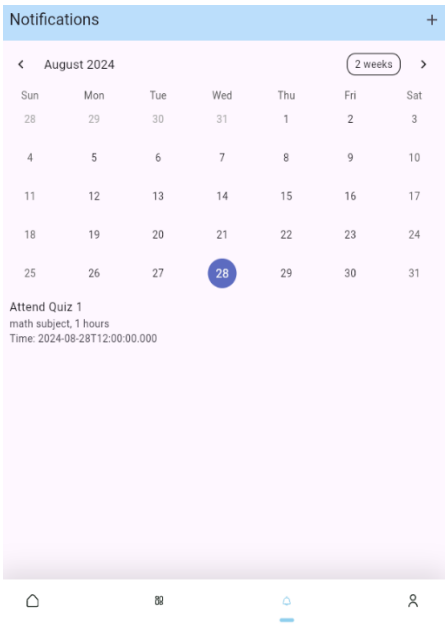


Figure 6.36 Reminder Notification Page

Figure 6.36 shows the Reminder Notification Page, presented in a calendar format, where users can interact with the calendar to view and add reminders.

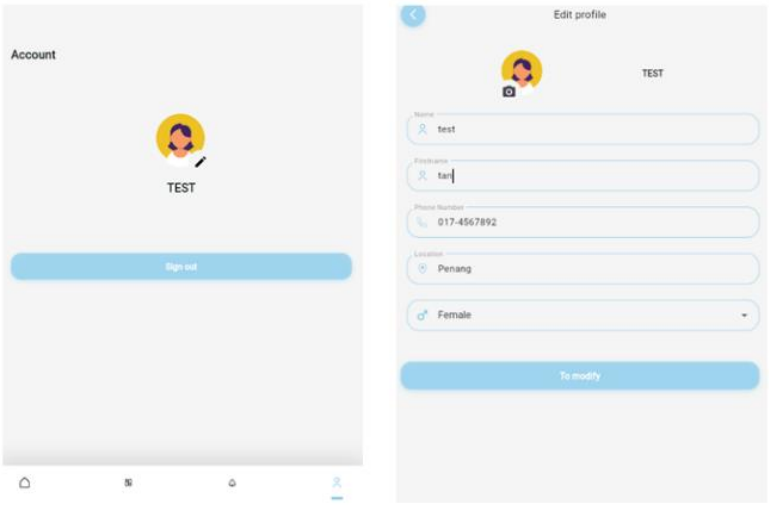


Figure 6.37 Figure User Profile, Edit User Profile

Figure 6.37 shows the User Profile page, where users can view and edit their profile details, as well as sign out. The Edit User Profile page provides options for updating personal information.

6.1.2 Version 2: Enhanced Features and User Interface with Feedback Integration

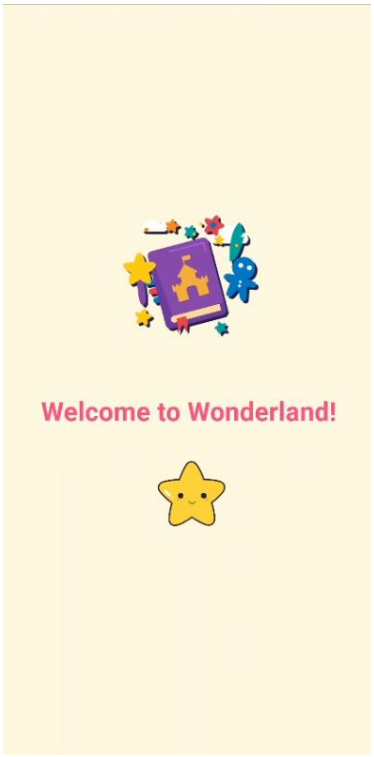


Figure 6.38 Splash Screen

The Splash Screen, as shown in Figure 6.38, serves as the first interaction users have when launching the app. Its primary purpose is to create a friendly, welcoming first impression while preparing the app to navigate users to the next screen. The Splash Screen visual is vibrant and playful, featuring a cheerful animated storybook and twinkling stars, with a friendly and colourful message, "Welcome to Wonderland!"

The app silently verifies the user's sign-in status while the animations are playing. If the user is a newcomer and hasn't logged in before, the app will automatically direct them to an introductory screen that outlines how to use the app. If the user possesses an account but is not currently signed in, they will be redirected to the login and registration page. If the user is already logged in, the app will smoothly shift to the main learning section, enabling them to pick up right where they stopped, ensuring a personalised and seamless user experience.

Figure 6.39 Intro Screen

Figure 6.39 shows the Intro Screen of the Kindergarten E-learning App, designed to warmly welcome new users and introduce them to the key purpose of the platform. It provides a smooth, two-step walkthrough that highlights how the app makes learning fun, engaging, and accessible anytime and anywhere. The screen uses colourful illustrations and friendly text to quickly communicate the value of the app to both parents and young learners.

When the user first opens the app, they see the first page of the introduction. This page features a cheerful image with the message “Making learning accessible everywhere” and encourages users with the phrase “Have fun learning anytime.” This sets a positive and inviting tone, letting users know that the app is built to support learning on the go, enjoyably. Swiping to the second page of the introduction, users are introduced to the core idea of the app as “An e-learning platform.” Again, the phrase “Have a fun learning anytime” is emphasised to reinforce the ease and flexibility of using the app. On this final page, there is a clear and friendly button labelled “Let's Start”. By tapping this button, users can move directly to the next step and begin their journey into the learning environment.

Additionally, for users who are already familiar with the app or wish to skip the introduction, a “Jump” option is conveniently located at the top right corner of the screen. This allows users to quickly proceed to the login page without going through the entire introduction.

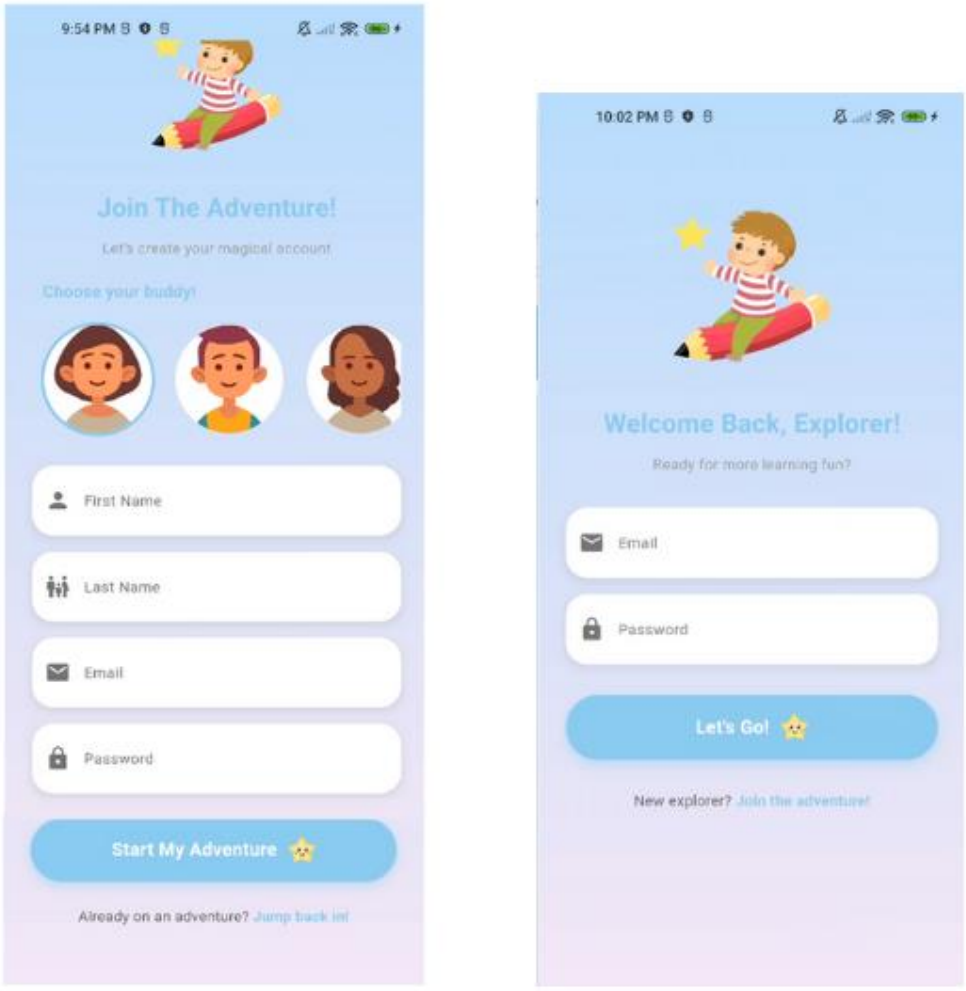


Figure 6.40 Login Page, Register Page

The Login and Register page, as shown in Figure 6.40, is made to give young learners an easy, welcoming, and kid-friendly experience at the same time ensure user authentication. On the Register Page, new users can register by providing their email address, password, and first and last names. To make the procedure interesting and fun, they can also select a character avatar from a collection of charming, illustrated images to customise their profile. They are encouraged to start their educational adventure with a big, appealing button with the words "Start My Adventure." A happy success message confirms their registration if all the information is input correctly.

Returning users only need to input their password and email address on the Login Page before selecting the "Let's Go!" option to log in. They are gently instructed on what to do next by friendly and clear messages if any information is wrong or their account cannot be identified. Smooth animations, vibrant backgrounds, and soft, rounded buttons all contribute to the page's kid-friendly feeling. Users may quickly navigate between the sign-up and login choices at any point through clear blue colour links below the button.

Figure 6.41 Home Page

Figure 6.41 shows the Home Page, which welcomes young learners with a bright, colourful, and playful design that immediately captures attention. The background features a soft, cheerful gradient blending pink, blue, and yellow tones, creating a warm and inviting atmosphere. As the screen opens, a smooth curtain effect reveals the content, making the introduction feel theatrical and exciting. Twinkling stars, a pastel rainbow, and floating hearts, stars, and clouds bring a sense of magic and liveliness to the scene.

The bold app name "eLearning Wonderland" appears prominently at the top centre in a friendly, playful font, with a subtle glow that makes it stand out. In the middle of the screen, a charming school building stands as the main focal point. Inside the school building, there are two large, colourful doors labelled "Math" (in yellow) and "English" (in green). These buttons gently bounce and shake, drawing attention and inviting children to tap and start exploring their favourite subject. A friendly mascot character appears in the bottom corner, smiling and holding a speech bubble that says welcoming words, encouraging kids to get started with excitement. When a child taps on one of the subject door buttons, a burst of colourful confetti showers down, celebrating their choice and making the experience feel joyful and rewarding to bring them to the respective subject page.

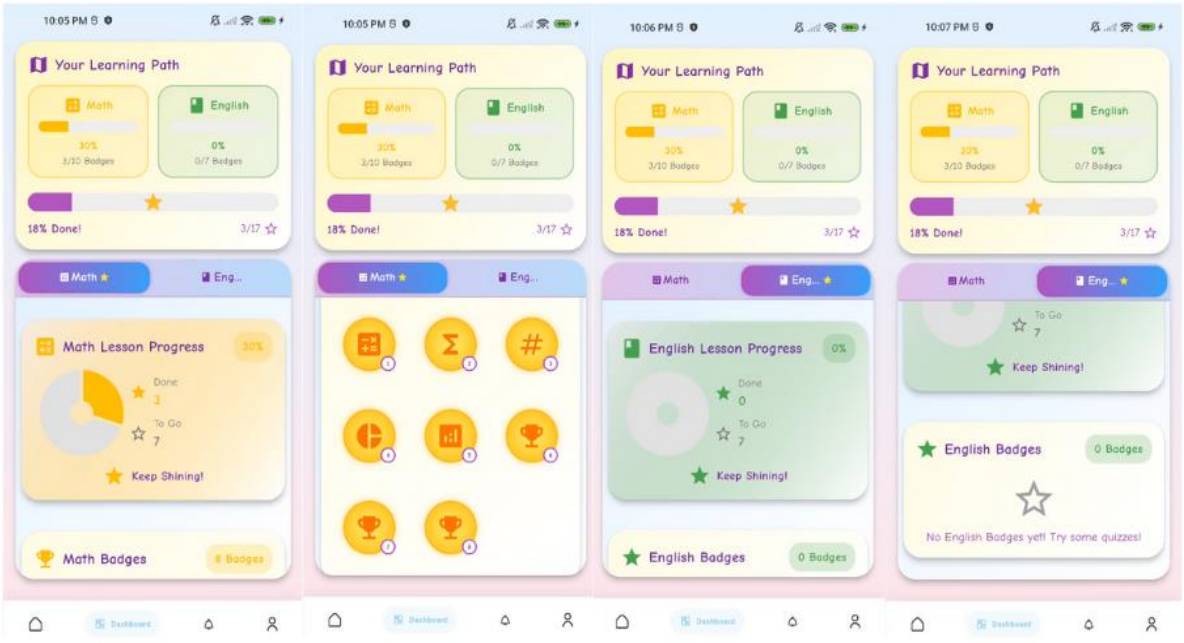


Figure 6.42 Dashboard Page

The Dashboard Screen, depicted in Figure 6.42, offers a vibrant and engaging area for young students to observe and celebrate their advancements in English and Math. Two vibrant cards,

green for English and yellow for Math, with progress bars, percentages, and lesson counts, are used to display progress in the "Your Learning Path" section at the top. The overall progress across all subjects is shown via a purple progress bar with a bouncing star animation.

Beneath the progress overview, students can use the interactive "Math" and "English" sections tab buttons to look deeper into their accomplishments. When a tab is selected, a collection of glistening badges commemorates achievements acquired in that subject, as well as an energetic pie chart showing subject completion, is displayed. Tapping on a badge brings up a pop-up window with its name, the achievement it represents, and the date it was awarded, all with playful visual effects to keep the experience interesting. When a learner hasn't earned any badges yet, or when there's a problem, such as a poor internet connection, a cute bear mascot shows up with positive messages, mentioning the user has no badges yet or showing that something is error.

The Dashboard Screen effectively combines clear visual indicators, encouraging rewards, and smooth navigation to help children understand their learning journey in an enjoyable way, making tracking progress feel like a celebratory adventure rather than a task. Progress tracking is made enjoyable and fulfilling for young learners by this screen, which not only educates them but also motivates them to keep going.

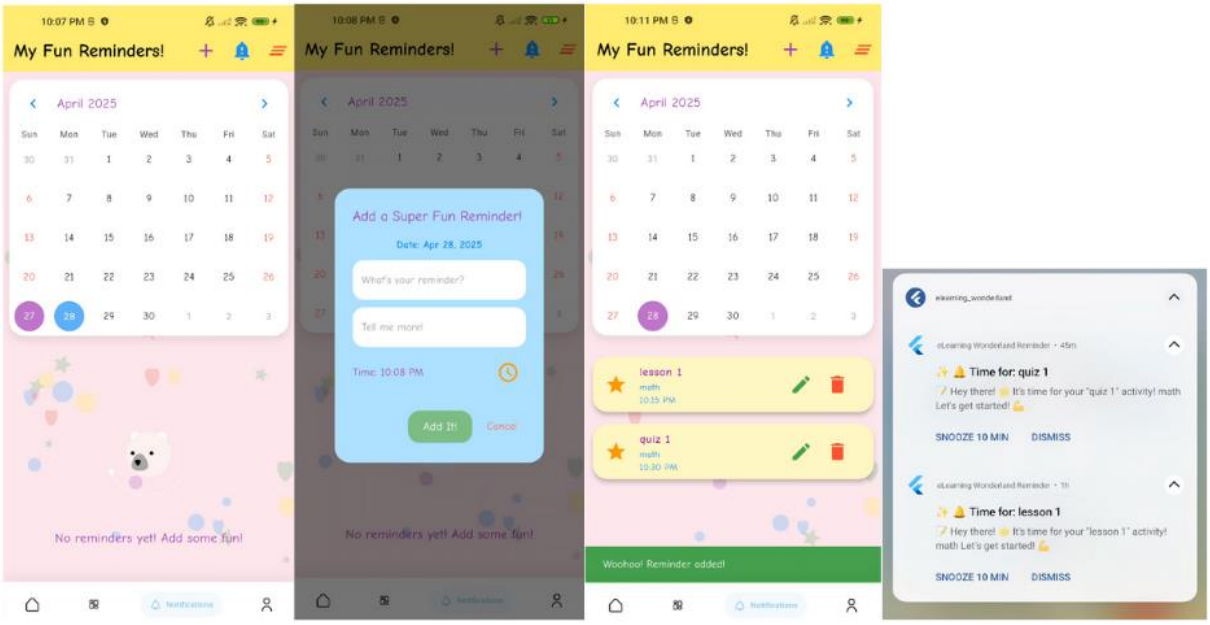


Figure 6.43 Reminder Notification Page

The Notification Screen, depicted in Figure 6.43, is intended to assist young learners with maintaining organisation by handling their study reminders in an engaging and accessible manner. The centrepiece of the screen is an interactive calendar, framed within a clean white card that highlights the selected day and today's date with distinct colours, so that today's date will be highlighted in blue, while the selected date will be highlighted in purple, making navigation intuitive. When a date is selected, the screen automatically loads and displays reminders for that day. These reminders are shown as clear, well-organised cards with a title, details, a star icon, and convenient edit and remove buttons. In the situation that there are no reminders, a pleasant message and a cute bear animation entice users to add more, keeping the environment cheerful and interesting.

Three easily recognisable action buttons at the top-right of the screen let users instantly add a new reminder, test a notice, or clear all their pushed scheduled notifications on the notification bar. When a reminder is added or edited, a straightforward dialogue box appears where users may enter the time, title, and description. Reliability is ensured by built-in validation, which also helps to avoid reminders that are past due. These notifications are automatically scheduled to push at the selected time as reminders. Reminders can be edited or deleted to easily keep everything in sync by updating the Firestore database and the scheduled notifications. Young learners may easily keep track of their study tasks by using the combination of interesting visuals, straightforward management tools, and reliable cloud connectivity.

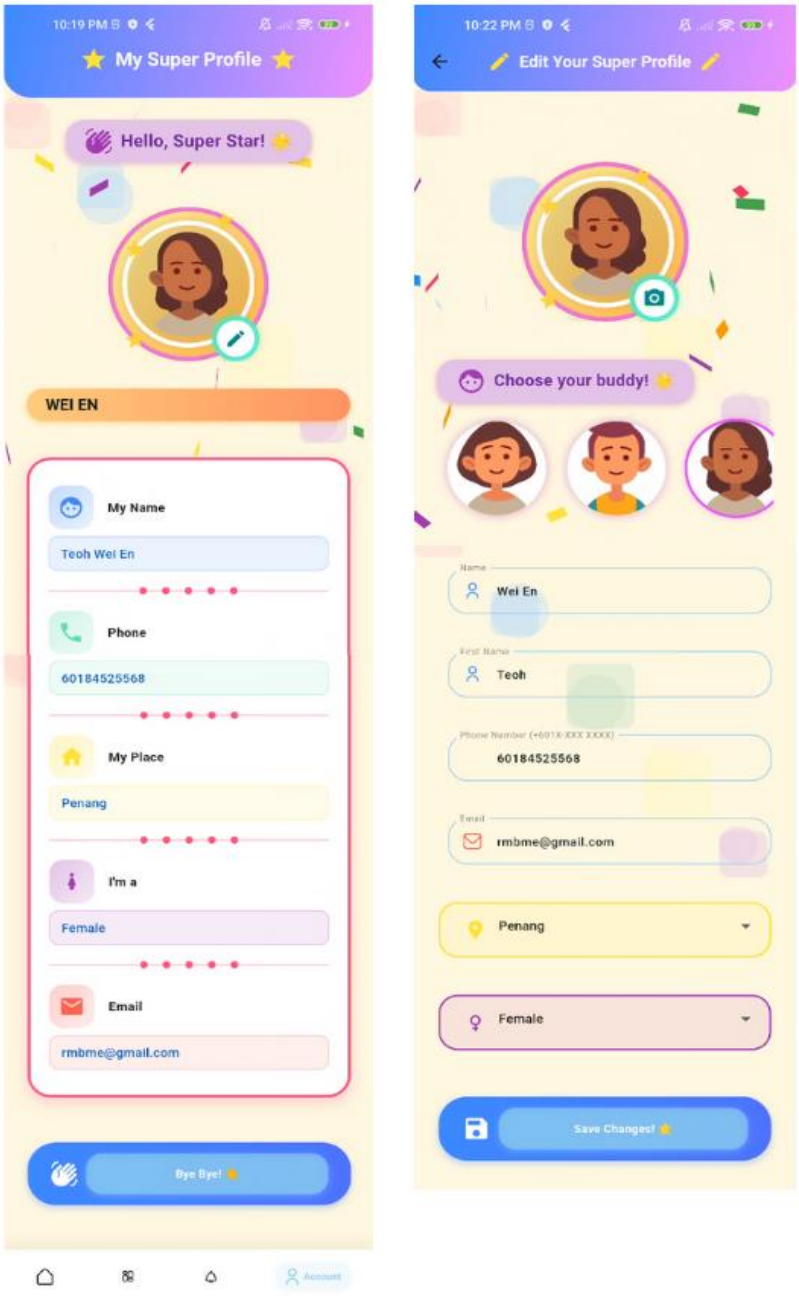


Figure 6.44 User Profile Page, Edit Profile Page

The User Profile Page and Edit Profile Page, which are depicted in Figure 6.44, provide a fun and engaging environment for young students to browse and edit their profiles. An explosion of confetti provides a celebratory effect once the Account Screen loads. The headline "My Super Profile" is displayed in a friendly font on a bright blue-to-purple gradient app bar, with yellow star icons to add to the cheerful environment.

A circular profile photo surrounded by a slowly moving amber star and a bright purple ring serves as the main image of the User Profile Page. The user's name appears on a rounded orange

gradient card below it, and other personal information, including phone number, location, gender, and email, is arranged neatly on a white card with colourful icons for easy identification. A welcoming "Bye Bye!" logout button at the bottom makes it quick for users to sign out, while the edit button, which is shaped like a green-teal circle with a pencil icon, supports users to start updating their profiles right away.

Users can easily update their information on the Edit Profile Page after tapping the edit button. Users can select among six vibrant avatars in a row that can be scrolled horizontally, or they can tap the profile photo to upload a new image. Users can edit their name, phone number, email, state (using a dropdown menu for Malaysian states), and gender (using toggle icons) in the colourful, rounded form fields below. By clicking the "Save Changes!" button, the user verifies that all inputs, including phone numbers and emails, are formatted appropriately and updates the data in Firestore. When an update is successful, a success message with animated confetti is displayed, the profile is instantaneously refreshed, and users are taken back to the User Profile Page. Uploads are carefully managed with fallback behaviours, and clear snackbars offer helpful feedback for any issues. Information feels like an enjoyable, game-like activity, encouraging interest in their educational path and a sense of ownership.

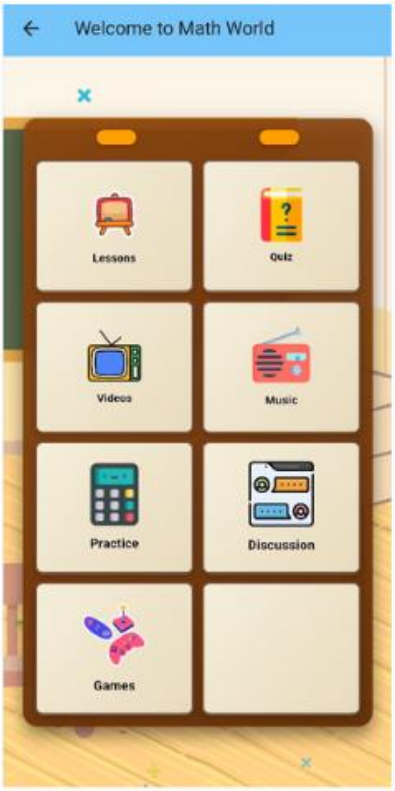


Figure 6.45 Math Category Page

The Math Category Page, shown in Figure 6.45, is intended to give young learners an interesting setting with a math classroom theme. The animated addition, subtraction, multiplication, and division signs that float softly over the screen in the background highlight the math education concept in a fun way.

With a 4x2 grid of compartments that resemble a real wooden cabinet, the layout includes interactive buttons for lessons, quizzes, videos, music, practice, discussions, and games. Playful animations, such as a soft bouncing effect, are used to visually enhance the buttons, giving the page a lively and energetic feel. Each button illuminates momentarily when clicked, then takes the user to the corresponding screen, guaranteeing an enjoyable and straightforward experience. Generally considered, the Math Category Page offers a neat, intuitive layout that promotes engagement with math-related activities in an enjoyable, classroom-like environment.

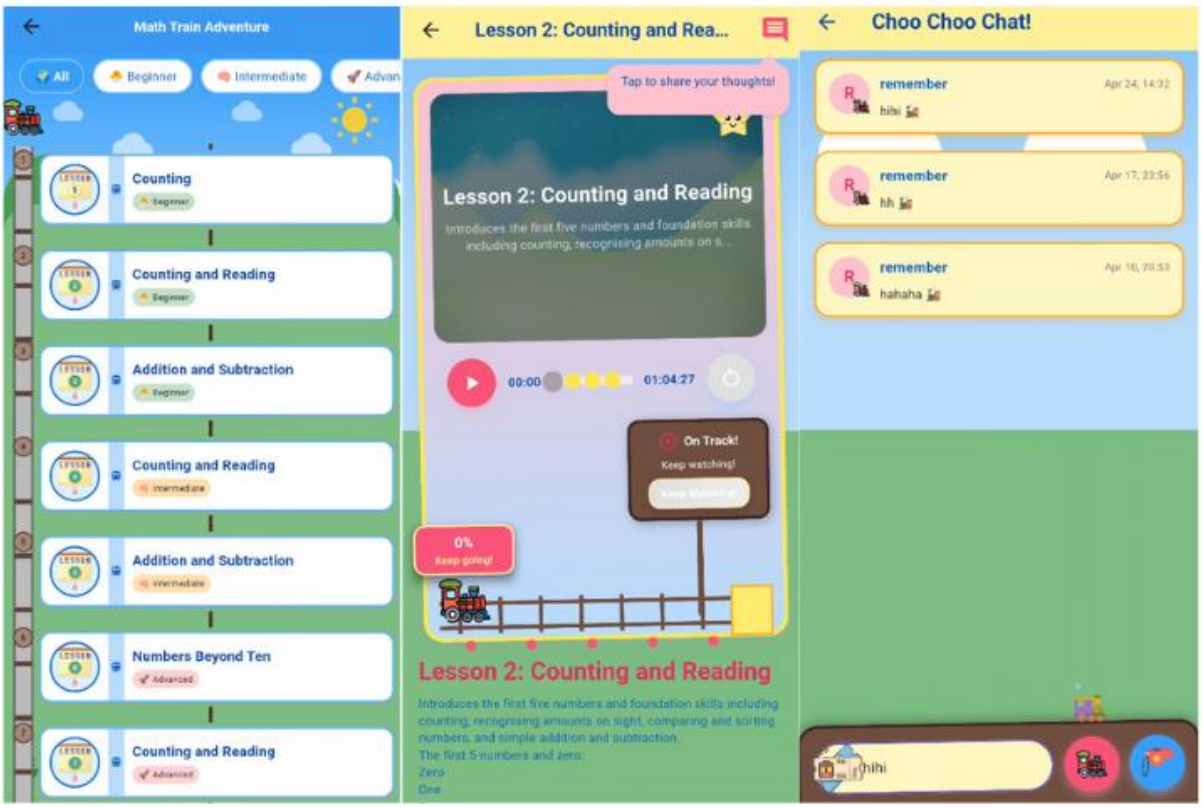


Figure 6.46 Math Lesson Page, Detail Math Lesson Page, Math Lesson Comment Page

Figure 6.46 shows the Math Lesson Page, Detail Math Lesson Page, and Detail Math Lesson Comment Page, which utilise a playful train theme, bright colours, and animations to make math learning fun and immersive.

The Math Lesson Page serves as the gateway to the math adventure, styled like boarding a train journey. It features a filter system with tabs for sorting lessons by difficulty (Beginner, Intermediate, Advanced), helping learners select appropriate content. Each lesson is treated as a station along the train journey, inviting kids to explore various math topics through an interactive interface. A vertical train track runs down the page, with station markers for each lesson. Lessons are displayed as cards, each with a circular image title, lesson name, and a level indicator. Once a lesson is selected, the train moves along the track as users tap on lesson cards, and the app navigates to the Detail Lesson Screen page of the respective lesson.

The Detail Math Lesson Page offers an immersive video-based learning experience. A dynamic video player, colourful progress controls, and animated elements keep learners engaged. A train moves along a horizontal track to visualise video progress, bouncing and emitting smoke as it advances. As the video progresses, the train bounces and emits smoke, with a tooltip showing the current progress percentage. The lesson's title and description animate into view, and when the video is completed, celebratory animations like confetti bursts and a star icon reward the learner. Progress is saved, and the “Mark Done” button is activated after 85% completion, rewarding learners with additional animations and congratulatory messages. Importantly, the learner’s video progress is automatically saved and securely stored, ensuring that they can seamlessly continue from where they left off when they return to the lesson in the future. This feature supports flexibility and encourages consistent engagement without the need to repeat previously viewed content.

A comment icon on the screen invites users to visit the Detail Math Lesson Comment Page, which is styled like a train station bulletin board. This interactive page allows learners to share thoughts through text or voice comments. An input area allows users to type their comments, while a speech-to-text feature lets them voice their thoughts, with a typewriter-style animation showing the transcribed text. The voice feedback feature adds accessibility, allowing younger children or those less familiar with typing to participate easily. A moving train animation above the input panel tracks activity, maintaining the train theme. Together, these pages create a cohesive math learning experience that feels like a train journey through a magical math world.

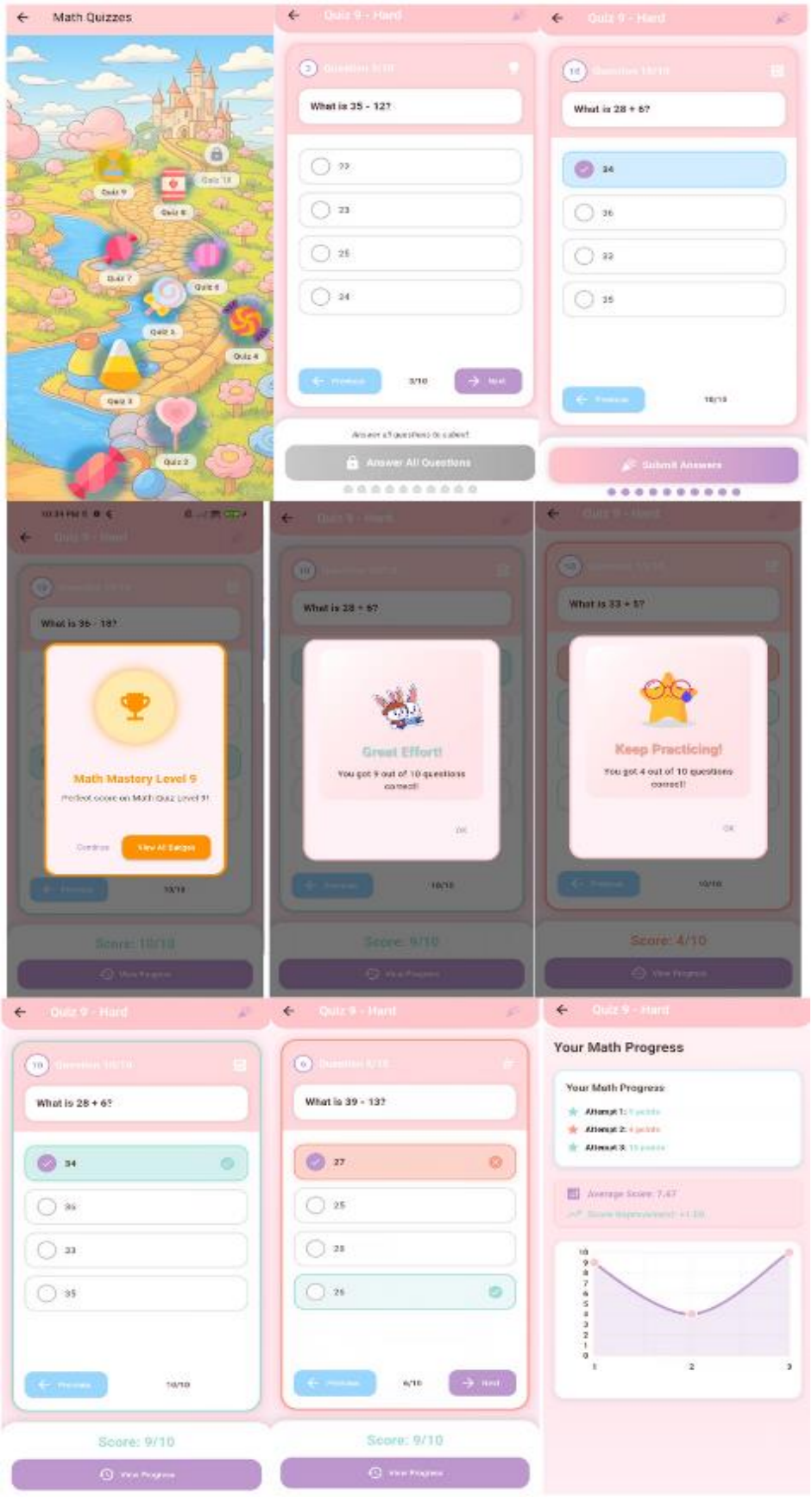


Figure 6.47 Math Quiz Page, Detail Math Quiz Page

The Math Quiz Page, and Detail Math Quiz Page, is shown in Figure 6.47, intended to test the learning outcomes of the kids in a fun and attractive way. Children can take quizzes, monitor their progress, and celebrate their accomplishments as they go through several stages in this engaging and vibrant environment.

The lively candy-themed background of the Math Quiz Page greets visitors and fosters a fun and comfortable environment. To create a feeling of journey, the colourful, circular quiz buttons are arranged like an adventure map, with older quizzes appearing larger and later ones smaller. The next unlock quiz bounces softly with a bright yellow glow, making it easy to find. The readily accessible quizzes glow with a glowing blue effect. Quizzes that require completion of earlier levels are marked with a lock icon and appear grey.

The Quiz Detail Page is where users can begin answering questions after tapping on a quiz candy button. The "Previous" and "Next" buttons are marked, and users can swipe left or right to go between questions, and only when all questions are answered, the submit button will be active. Following the completion of all quiz questions, the user is provided with a breakdown of their score as well as lively feedback and friendly animations to commemorate their accomplishments. They can see a straightforward chart that illustrates how their performance has changed over the attempts, boosting their confidence and motivation to keep studying. The user will then be directed to the Detail Math Quiz Page, where the border of the question cards will either turn red with the correct answer marked if the answer is wrong, or green to indicate their selection was correct. Achieving a perfect score also earns special badges and rewards, which serve as an additional source of motivation, and new quizzes are unlocked automatically as they successfully finish existing ones.

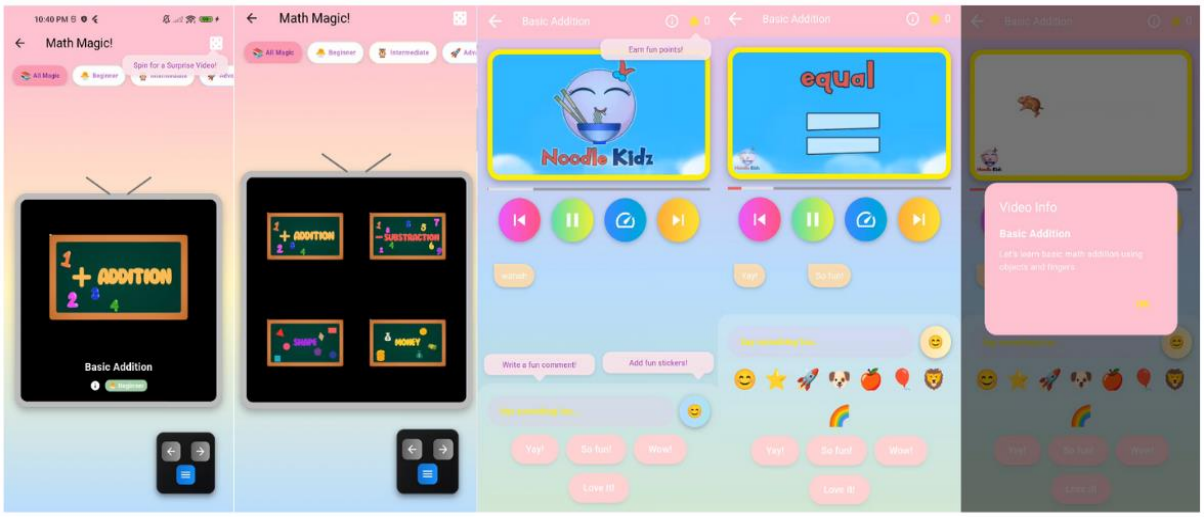


Figure 6.48 Math Video Page, Detail Math Video Page

Figure 6.48 depicts the Math Video Page and Detail Math Video Page, which were both delicately developed to provide a fun, dynamic, and engaging environment for young learners to discover mathematical ideas through video.

The primary interface for viewing and choosing math videos is the Math Video Page, which is in a unique retro TV-inspired style. Video thumbnails are displayed on a dynamic TV screen, and users may switch between a grid menu and a single-video view using a remote control-style interface in the bottom-right corner. There is a "casino" icon button at the top right of the page that chooses a movie at random, creating a sense of surprise and promoting investigation and curiosity. Kids may use the user-friendly tabs with emojis to filter videos by difficulty level: All, Beginner, Intermediate, or Advanced.

The Detail Math Video Page, which emphasises video playback and interaction, is where viewers go after choosing a video. When the page is loaded, there will be some tooltips that show to give simple instructions on the button on the page. Users can click on the info icon at the top navigation bar to get the title and descriptions of the video. The video player has easily accessible play/pause, navigation, and speed adjustment options. Kids can participate in the video by adding emoji stickers or leaving comments, which show up contextually at points in the timeline. Stickers appear and disappear with delicate rotations and scaling effects, while comments appear as animated balloons, increasing user interaction. When users participate through stickers and comments, they receive "fun points," which are visually monitored next to an animated star icon. New emojis are unlocked by milestone accomplishments through

collecting fun points, encouraging more engagement. To ensure accessibility for young learners throughout the experience, helpful tooltips provide guidance and explanations of key elements.

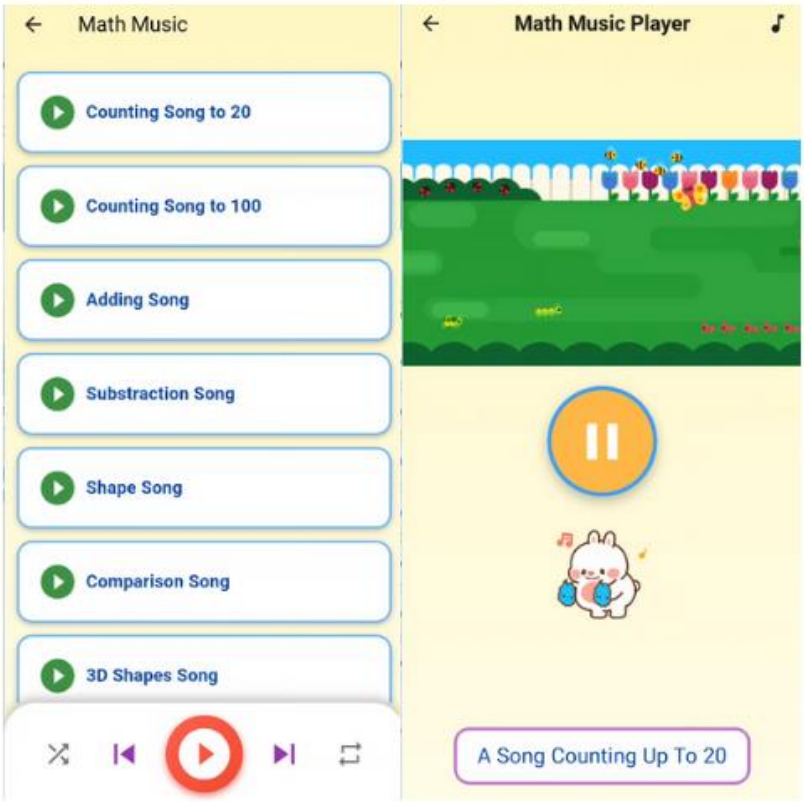


Figure 6.49 Math Music Page, Detail Math Music Page

Figure 6.49 shows the Math Music Page and Detail Math Music Page, which combine interactive activities, music, and videos to provide a fun and engaging learning environment for younger learners. Children can explore and listen to a range of math-themed songs on the Math Music Page, which serves as a vibrant and upbeat music player. There are straightforward controls for play, pause, next, previous, shuffle, and repeat, and the songs are presented in an easy-to-navigate list. It is simple to follow because the music that is presently playing is marked. Children can easily switch to the Detail Math Music Page to watch a related video version of a song once they click on the song name. The screen has interactive features, including shake-to-reveal surprises, tap effects, and celebratory animations at the end of the program to keep viewers interested. To aid children in understanding the content, the video player includes a brief description and easy-to-use play/pause controls. When the video is playing, there will be a bunny that keeps on dancing to encourage you to continue watching.

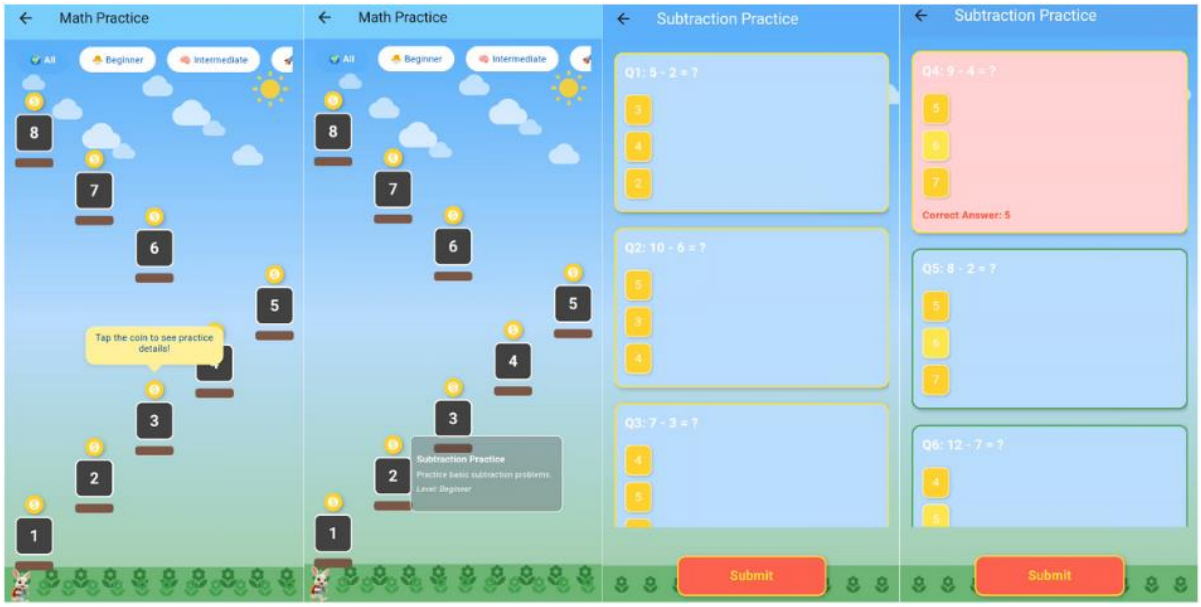


Figure 6.50 Math Practice Page, Detail Math Practice Page

Figure 6.50 depicts the Math Practice Page and Detail Math Practice Page, which work together to provide an interesting and interactive environment for young learners to practice Math in the eLearning Wonderland application.

The Math Practice Page serves as the entry point, with a game-like interface in which a bunny character hops along a zigzagged course of numbered platforms. Every platform symbolizes a mathematical task, and kids can select tasks according to their proficiency level. To make navigating easier, the All, Beginner, Intermediate, and Advanced tabs are labelled with comical emojis. With its gradient blue sky, green ground, floating clouds, and brilliant flowers, the design's nature-inspired background creates a lively and attractive setting. When the page loads, there will be a tooltip that shows above the coins icon to inform users that clicking on the coin's icon will get the information of the respective practice. To make sure kids understand what each activity entails, tooltips direct users to tap coin icons on platforms that show information, including the activity title, description, and level. This entertaining design makes arithmetic practice feel like a game and promotes exploration.

Children are taken to the Detail Math Practice Page after choosing an activity, where they finish a multiple-choice practice. Four possible answers are provided for each question, which are displayed in rounded containers. Children see a results screen with retry suggestions for improvement or celebration animations for the right responses after submitting. Lottie animations improve feedback and encourage users to continue honing their skills. Then, it goes

to visual feedback for the answer, which is red for wrong responses and green for right ones. To aid in reinforcing learning, the right response is displayed whenever an answer is incorrect. Children can develop their math abilities at their own pace in an entertaining, stress-free environment that is enhanced by interactive features, positive reinforcement, and obvious visual signals.

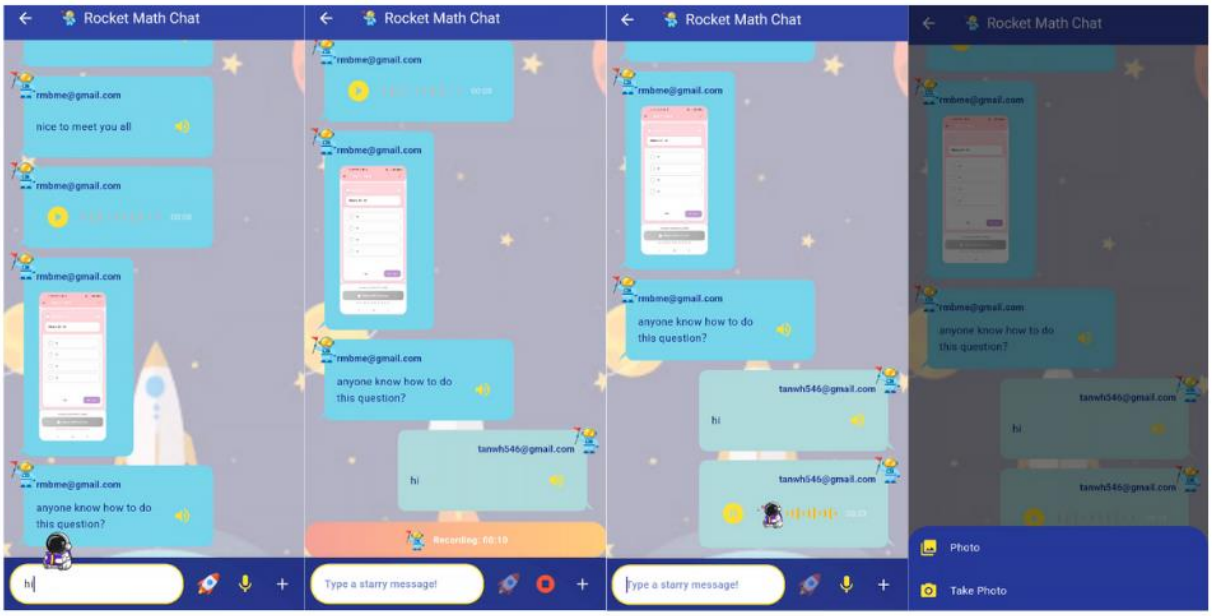


Figure 6.51 Math Discussion Room Page

Figure 6.51 depicts the Math Discussion Room Page, which is a lively, space-themed interaction page designed to foster mathematical discussions among students in an enjoyable and interesting manner. The theme centers on space exploration, with elements such as rocket ships, astronauts, and outer space imagery, making learning feel like an exciting adventure.

The chat room's design features humorous elements, such as cloud-shaped speech bubbles with astronaut avatar icons, underscoring the fun and approachable aspect of the site. As users interact with the chat room, they can send text messages, audio recordings, and photographs, allowing them many ways to express their mathematical thoughts. Caters to varied learning styles, allowing students to share textual explanations, verbal reasoning, and graphic representations of mathematical concepts. To increase user engagement, the app contains several interactive elements in addition to regular text messaging. Voice recording controls are color-coded (yellow for record and red for stop), making them simple to find and use. Voice messages are accompanied by animated waveform visuals that adapt to playback, making audio communication more dynamic and engaging. A text-to-speech tool lets users listen to written

communications, which improves accessibility and caters to auditory learners. Images posted in the conversation can be extended with an interactive viewer, allowing users to zoom and pan for a closer look at mathematical diagrams, graphs, or handwritten notes. The interface also includes some funny visual elements: astronaut avatars bounce slightly at the top of chat bubbles, and animated indicators display whenever users input or record messages. These constant visual signals keep interactions interesting and engaging throughout the experience. The real-time chat feature displays messages in chronological sequence, resulting in a smooth flow of discourse. Messages show in real time, with explicit sender attribution, encouraging community and accountability.

Beyond its appealing interface, Rocket Math Chat fosters a collaborative environment in which students may ask questions, exchange solutions, and discuss mathematical ideas in a low-pressure environment. The playful design decreases anxiety, and the many communication options promote expressiveness and peer learning. By allowing students to observe and build on each other's efforts, the software promotes collaborative problem-solving. It supports both synchronous and asynchronous chats, extending learning outside the classroom and fostering a sense of community.

Figure 6.52 Math Game Page

Figure 6.52 shows the Math Game Page, which presents a fun, interactive environment resembling an island map. The screen features animated pins and boats that represent different

math games. These pins appear one after another, creating a sense of progression, and are designed with bright colours and icons to make them easy to recognize. When a user clicks on a map pin, it takes them to a specific game, such as a "Treasure Game" or "Magical Garden."

In addition to the pins, there are animated boats floating across the screen. Some boats sail in different directions, while others stay in place, adding movement and life to the scene. Tapping on a boat reveals a fun message, making the experience even more engaging.

Overall, the design creates a playful, game-like atmosphere with colourful, moving elements that guide users through the different math games. The screen is visually appealing and interactive, making it enjoyable for users, especially children, as they explore and learn.

Figure 6.53 Math Expedition Treasure Hunt Game Page

Figure 6.53 depicts the Math Expedition Treasure Hunt Game Page, which has a pirate-themed adventure in which young learners develop essential math abilities through an interesting journey. By clicking the math game icon on the main math game screen, users will be sent to a colourful treasure map with a sequence of islands, each representing a level. The adventure begins with Level 1, which focuses on addition, followed by Subtraction in Level 2, Multiplication in Level 3, and Division in Level 4. Levels are opened gradually, and players win coins as they accomplish each stage to go forward on the island map.

When entering Level 1, players are guided through a demo session that introduces the mission, explains how to solve the math problems, and demonstrates how to interact with the game

elements. This demo ensures that young learners feel confident and understand the gameplay mechanics before starting their journey. This tutorial appears only in Level 1; subsequent levels jump directly into gameplay. In each level, players answer math questions with three possible choices. Correct answers reward coins and progress the player through the level, while a hint button helps when needed. The pirate-themed environment remains consistent throughout, with vibrant visuals such as ships, treasure chests, and animated pirate characters celebrating each correct answer. Sound effects improve the experience by providing feedback on accurate responses, incorrect tries, and successful level completions.

After finishing all four levels, players are returned to the treasure map screen, where a congratulations dialog appears to celebrate their accomplishment. This exciting moment recognizes their accomplishment and encourages them to continue exploring or replaying previous levels.

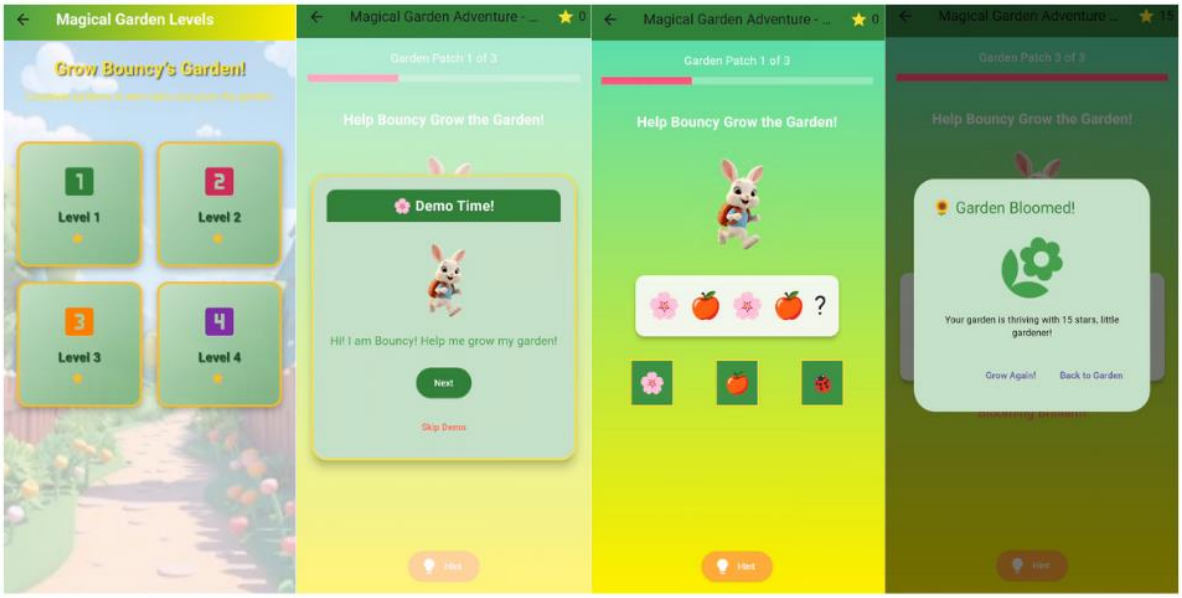


Figure 6.54 Garden Pattern Quest Game Page

The Garden Pattern Quest Game Page, as shown in Figure 6.54, is designed to help children develop important math skills in a fun and engaging way, focusing on pattern recognition. The game consists of four levels, each progressively more challenging. The first level includes a demo session where players learn how to solve the pattern puzzles, guided by Bouncy the Bunny. By completing the puzzles, children practice recognizing patterns, an essential skill in early math development. As players move forward, the patterns become more complex, encouraging them to apply critical thinking and problem-solving skills.

Correct answers trigger positive sounds, joyful animations, which show Bouncy the Bunny happily jumping or scaling up, and encouraging messages, creating a sense of accomplishment for the player. For incorrect answers, the game offers gentle, constructive feedback, suggesting ways to try again. This supportive approach helps children learn from their mistakes and encourages persistence. Rather than making them feel frustrated, the game helps kids understand why an answer was wrong, guiding them toward the right solution. This positive feedback loop builds their confidence and reinforces their learning.

Once all four levels are completed, a special celebration dialog appears, congratulating the player on their success and rewarding them for completing the entire game. This celebration fosters a sense of achievement and encourages children to continue exploring math in the future. The game effectively helps kids learn essential math concepts like pattern recognition, sequencing, and problem-solving in a playful and supportive way.

Figure 6.55 Jungle Counting Game Page

Figure 6.55 depicts Jungle Counting Game, a delightful jungle-themed game that helps young children acquire counting skills through participatory gameplay. Players begin at Level 1, where they learn to count jungle items such as apples, stars, and circles, aided by a demo session that explains the fundamentals of counting and selecting correct responses. Following the demonstration, they respond to three questions with immediate feedback and affirmation via animations, sounds, and supportive remarks. In Level 2, the complexity rises as players count animals and flora, including monkeys, fish, and leaves. This approach allows kids to gain assurance regarding counting by gradually increasing the difficulty of tasks. Completing levels with enough stars unlocks more challenges, culminating in a celebratory "Jungle Master"

dialog. The game promotes learning through visual counting and number recognition, allowing kids to practice associating numbers and quantities.

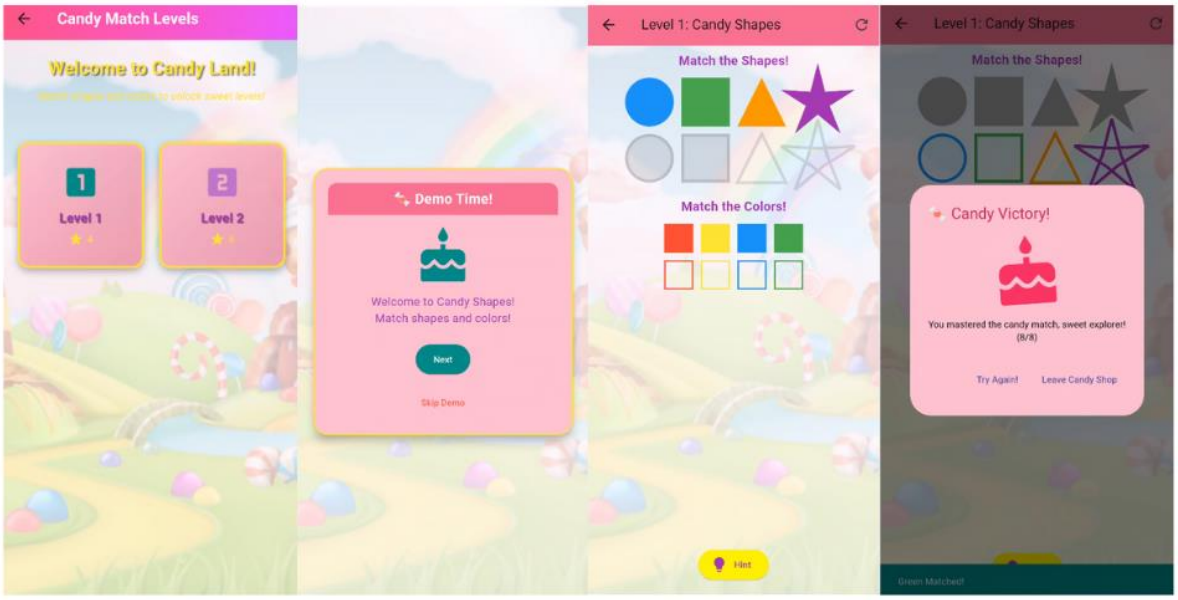


Figure 6.56 Candy Match Game Page

Figure 6.56 depicts the Candy Match Game Page, which is intended to help young kids develop basic numeracy skills such as colour and shape recognition. The game has two increasingly difficult levels that use a simple drag-and-drop interface. Level 1 students match basic forms such as circles, squares, and stars to their outlines, and colour matching. Level 2 offers complex challenges, such as matching shapes with colour names to the appropriate colour outlines, which promotes critical thinking. At the start of each level, players are guided by clear tutorials, accompanied by a friendly mascot, and can skip demos for self-paced study. Children can proceed more easily with interactive tools like hints and a reset button. Bright animations, upbeat music, and inspirational words all serve to generate positive reinforcement. Correct matches result in a spinning cake icon and triumphant music, while incorrect pairings elicit gentle encouragement.

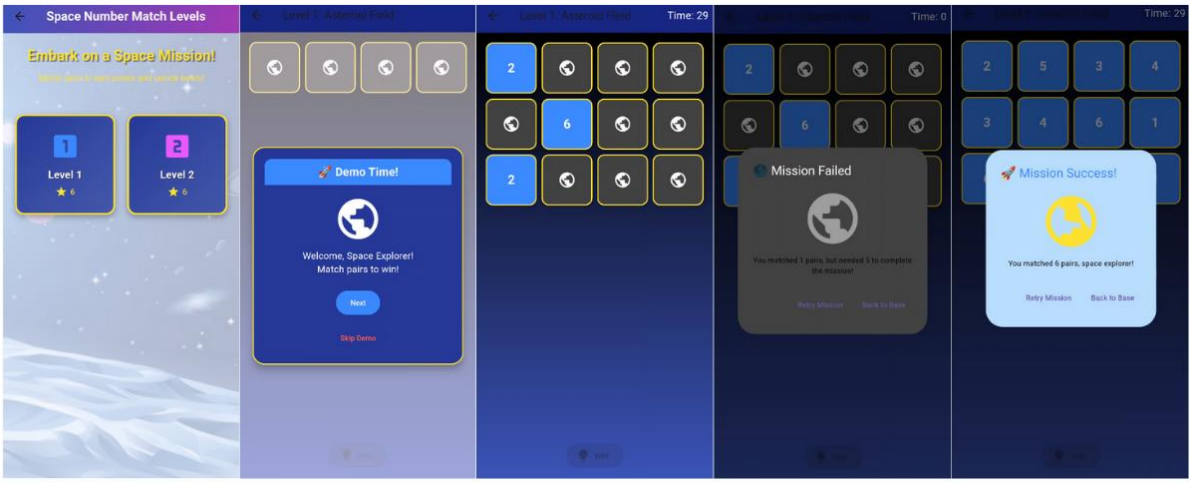


Figure 6.57 Space Number Match Memory Game Page

Figure 6.57 depicts Space Number Match Memory Game, a fun space-themed game that helps young children build number recognition, memory, and focus abilities. By combining bright images, interactive gameplay, and positive feedback, the game makes arithmetic practice into an exciting expedition in which kids become space explorers tasked with finding number pairs across the universe.

The game has two levels of increasing difficulty. In Level 1, players must match six pairs of numbers (1–6) in 45 seconds. Completing it unlocks Level 2, in which they must match ten pairs (1-10) within 100 seconds. A simple, optional lesson at Level 1 covers fundamentals such as touching cards to flip, matching pairs, and using the countdown timer. A hint button is available to display matched pairings as needed. Matched cards remain flipped in vibrant colours, while animations such as spinning planets and victory screens celebrate success.

The game encourages number recognition, counting, memory retention, and time management. Positive reinforcement, such as joyful sounds, encouraging words, and the option to retry, promotes confidence and tenacity. The space theme, simple controls, and gratifying progression, which culminates in achieving the "Space Master" title, make learning feel like a cosmic journey.

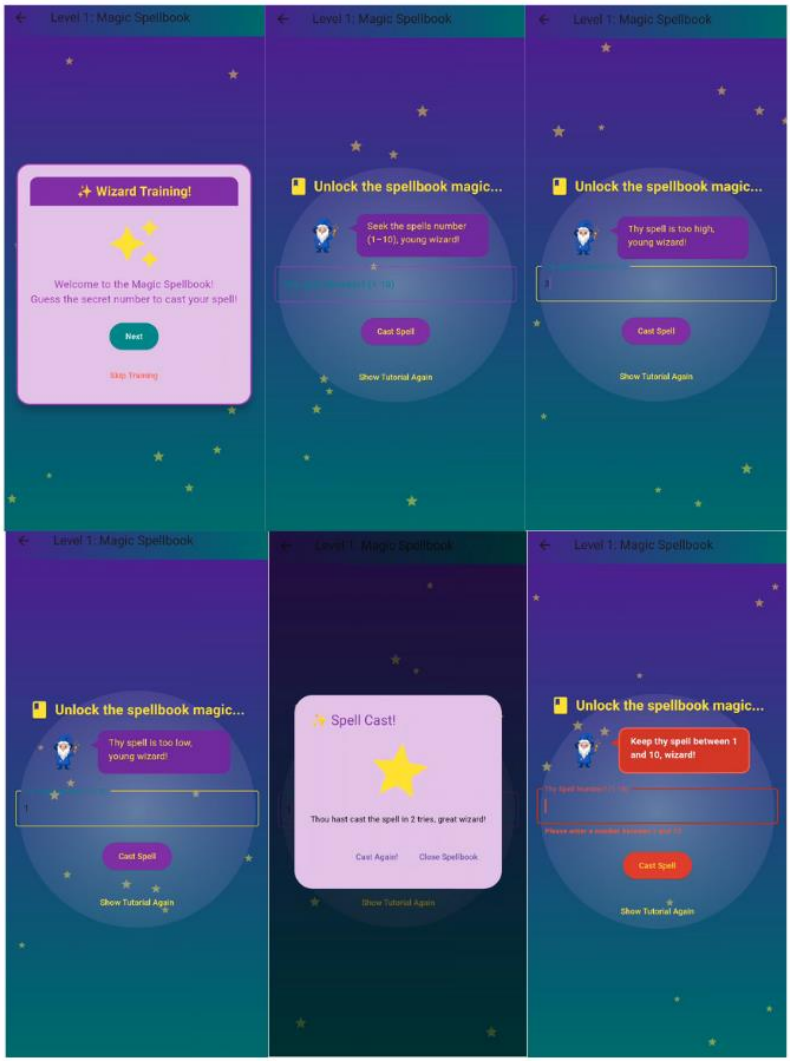


Figure 6.58 Magic Spellbook Number Guess Game Page

Figure 6.58 depicts the Magic Spellbook Number Guess Game, a game entails to engages young children's interest in math through a wizard-themed number-guessing adventure while also developing number recognition, comparison, and logical reasoning skills in young children. The game has a wonderful setting with a purple-to-teal gradient background, twinkling stars, and a friendly wizard mascot. A five-step tutorial explains the guidelines and can be skipped or returned to at any time. Players assume the roles of youthful wizards entrusted with unlocking a mythical spellbook by guessing a secret number between 1 and 10 in five attempts.

Users enter their guesses into an input window and press the "Cast Spell" button to receive immediate feedback, clues such as "too high" or "too low" direct them to the proper number. Throughout the game, animated stars, funny words, and positive feedback, such as "Great

wizard!" create an encouraging environment. A try counter measures progress, and correct guesses result in celebration effects like whirling stars and the title "Great Wizard." Invalid inputs, such as numbers outside the 1-10 range, trigger polite, red-bordered instructions that help children to amend their entry without frustration.

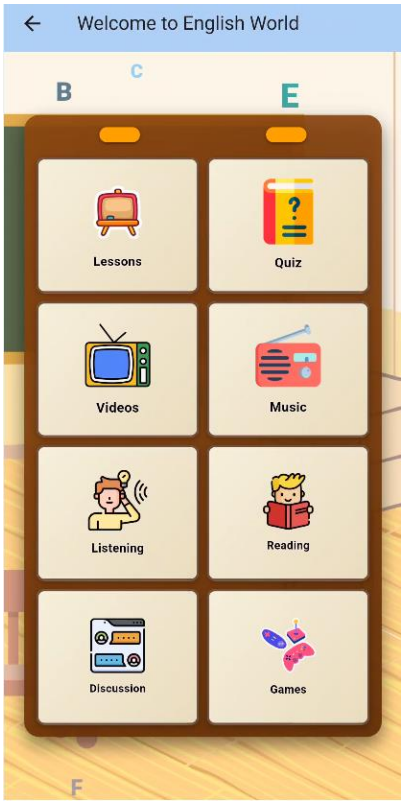


Figure 6.59 English Category Page

Figure 6.59 depicts the English Category Page, which welcomes children into an engaging and playful English classroom theme, allowing them to explore a variety of English learning activities. The background is vibrant and bright, with floating alphabet letters smoothly floating across the screen to create an interesting, exciting atmosphere that grabs interest and excitement.

At the focal point of the page is a large, welcoming wooden cupboard that contains all of the learning categories. This cupboard contains eight clear and bright buttons, each indicating a distinct type of activity: Lessons, Quizzes, Videos, Music, Listening, Reading, Discussion, and Games. Each button features a colourful picture and a straightforward name, allowing kids to easily recognize what they would like to explore. When kids click one of these buttons, it gently bounces with a soft light shimmer, providing a satisfying sense that they have chosen a fun

choice. The smooth and fun animation makes the experience more participatory and entertaining, while also gently directing them to the next page.

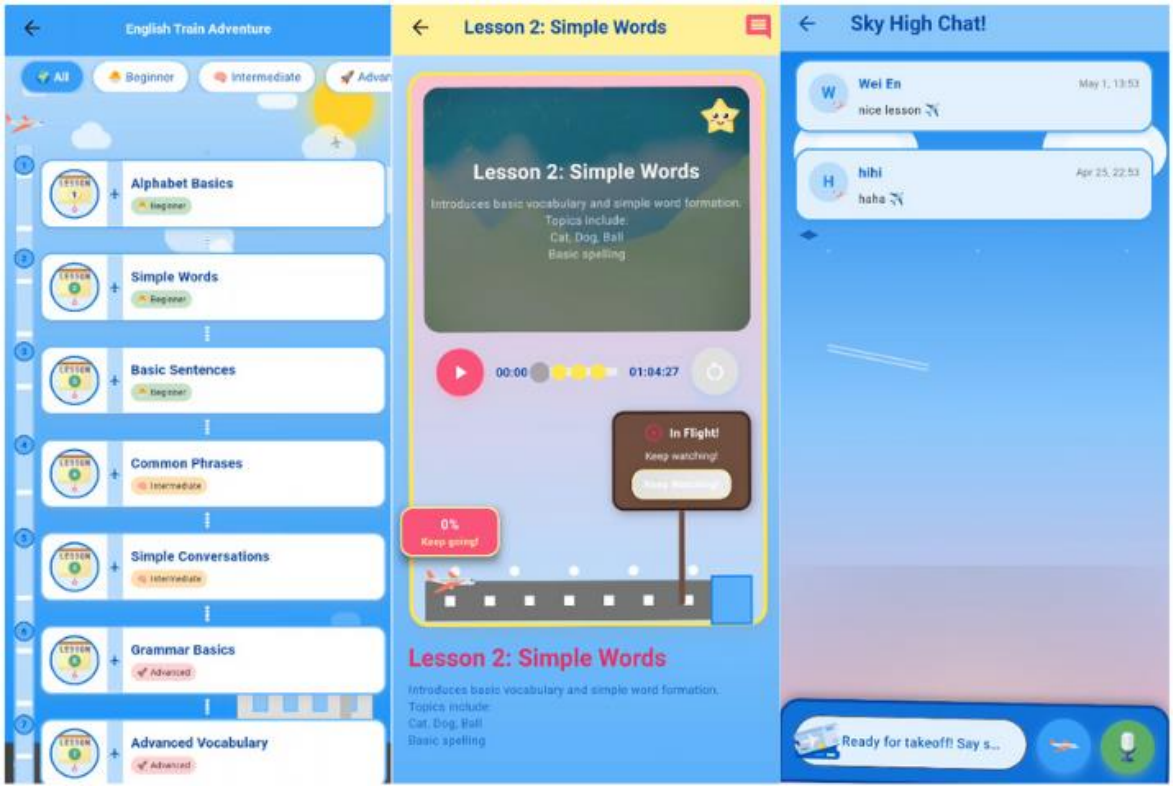


Figure 6.60 English Lesson Page, Detail English Lesson Page, Lesson Comment Page

Figure 6.60 depicts the English Lesson Page, Detail English Lesson Page, and English Lesson Comment Page, which provide an engaging and interactive style for users to learn English through a fun, airplane-themed trip. Lessons are presented as flight signs on a virtual runway, with colourful imagery, smooth animations, and a humorous interface that motivates users to get started. Lessons are divided into three difficulty levels: beginner, intermediate, and advanced, allowing students to readily select knowledge that is appropriate for their skill level.

An animated airplane takes off after the lesson card displays the title and level being chosen, bringing up the Detail English Lesson Page. As the video plays, a runway-shaped progress bar indicates completion. Watching at least 85% of the film results in a celebratory animation with confetti, making the experience enjoyable and engaging.

Users can participate in a community-driven comments area. Comments are designed like boarding passes, with the user's name and timestamp displayed. The app also enables voice

input, allowing you to express thoughts or ask questions hands-free. Playful design elements such as flying airplanes and fluffy clouds contribute to a welcoming, happy environment.

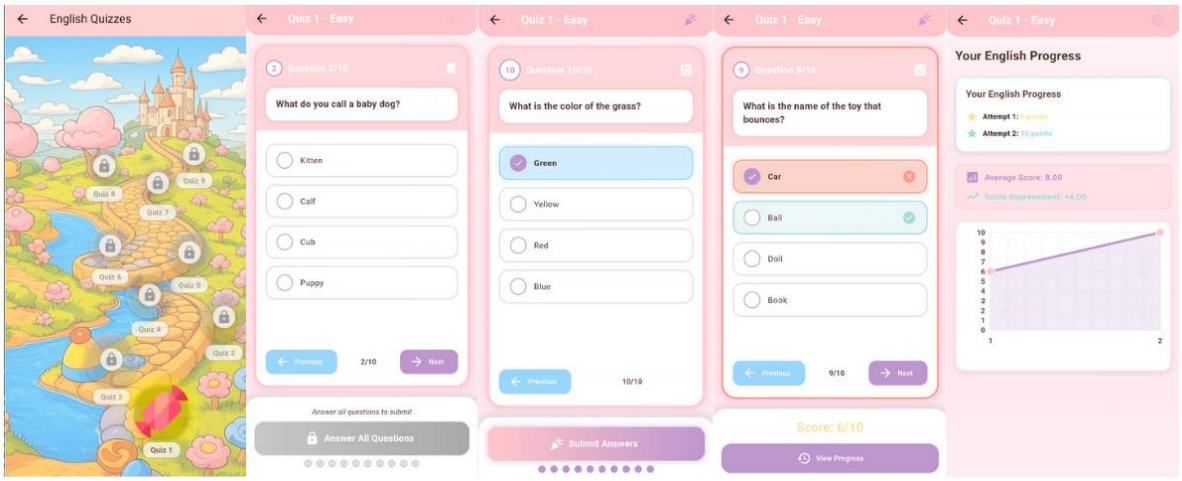


Figure 6.61 English Quiz Page, Detail English Quiz Page, English Quiz Analytic Page

Figure 6.61 depicts the English Quiz Page, Detail English Quiz Page, and English Quiz Analytic Page, which offer users a fun and interactive approach to test and improve their English skills. Its bright candy-themed design, dynamic animations, and personalized progress tracking keep learners motivated and delighted as they progress. The quiz trip begins with a fun selection screen with quizzes shown as colourful buttons distributed across a vivid background. Unlocked quizzes shine and bounce to draw attention, whereas locked questions are greyed out with a lock icon, making it easy to view the available quizzes.

Users select a quiz and then answer a series of questions displayed on swipeable cards. After finishing the quiz, customers receive immediate feedback via a celebratory pop-up with confetti, badges for perfect scores, and encouraging words, assuring a good learning experience regardless of performance. Then, users can examine their scores, track their progress over time, and browse graphic charts that depict their performance. Perfect scores receive special badges, which are complemented by sparkling graphics and upbeat music effects, making achievements feel satisfying and unforgettable. Quizzes unlock consecutively, encouraging users to learn gradually.

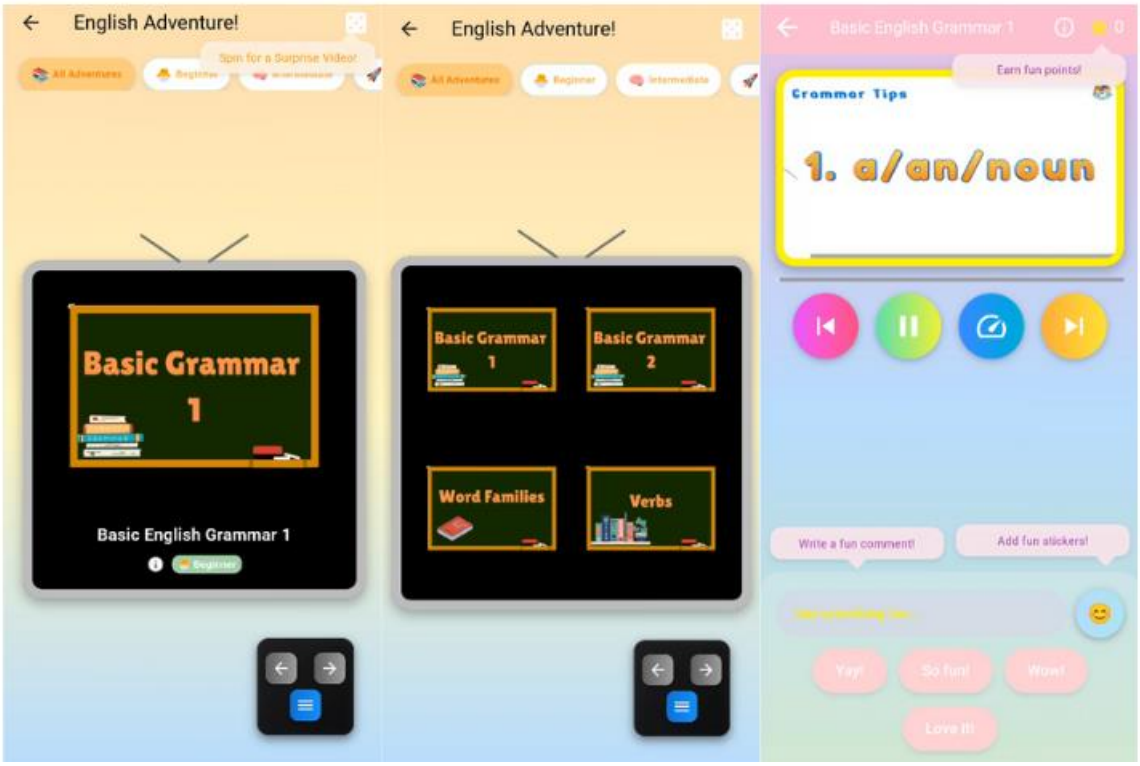


Figure 6.62 English Video Page, Detail English Video Page

Figure 6.62 shows English Video Page and Detail English Video Page. The English Video Lesson feature in the eLearning Wonderland app offers an engaging and interactive way for users to learn English through captivating video content. Tailored for learners of all levels, this feature combines vibrant visuals, playful animations, and a community-driven comment system to create a fun and motivating learning experience. Its intuitive design and rewarding elements make it easy for users to dive into lessons and stay committed to improving their English skills.

It begins with a colourful video selection screen that simulates a classic TV, replete with animated antennas. Users can sort videos by difficulty level (Beginner, Intermediate, or Advanced) or view all available English videos by a thumbnail and title, and a random icon button option provides a sense of surprise by randomly selecting a lesson. The interface is bright, with confetti effects and a remote control-style navigation mechanism that allows users to easily explore films.

When a video is chosen, users are immersed in an interesting learning experience. When the Detail English Page, just loaded, there will be tooltips that guide users through the interface, highlighting features like adding stickers or adjusting video speed. The video player has a

colourful, rounded border, and straightforward controls allow viewers to play, pause, alter playback speed, or move on to the next lesson. As they watch, viewers may score "fun points" by submitting comments or playful emoji stickers, such as stars or rainbows, that display on the screen at times. This fun point can then unlock new emojis. These stickers and comments, which are safely saved in the app's backend, promote a feeling of community by allowing users to share their enthusiasm and interact with others, thereby improving the social component of learning.

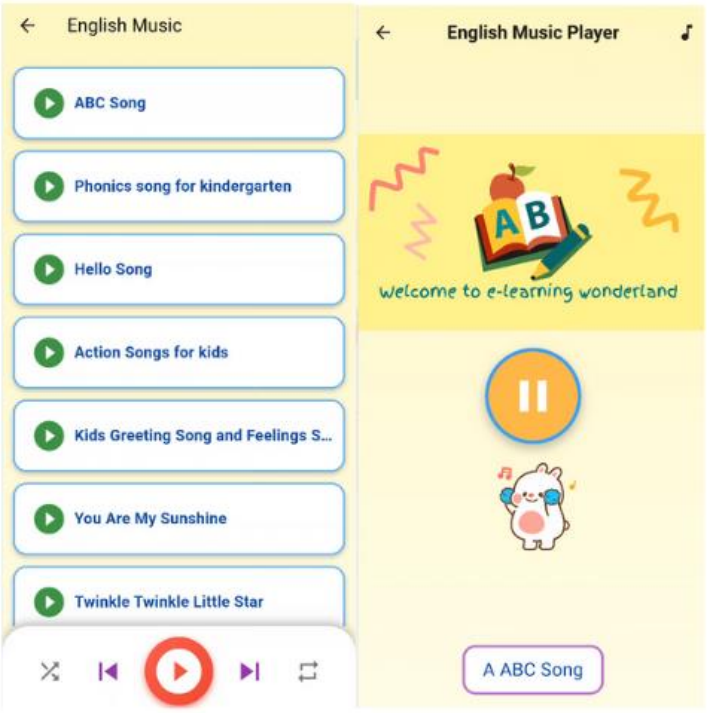


Figure 6.63 English Music Page, Detail English Music Page

Figure 6.63 shows the English Music Page and Detail English Music Page, which offers a joyful and interactive way for users to learn English through music and engaging video content, blending vibrant visuals, intuitive controls, and playful animations to make language learning fun and accessible for all ages.

The feature starts with a cheerful music selection screen, where users can browse a list of songs displayed as colourful cards in a sunny, yellow-themed interface. Each card highlights a song's title and allows users to play or pause it instantly, with the current song glowing to stand out. A sleek control panel at the bottom offers options to shuffle, repeat, or skip tracks, giving users flexibility to customize their listening experience. Tapping a song opens a detailed view, immersing users in a dynamic learning environment tailored to enhance engagement.

In the detailed English music page, users watch music videos within a bright, inviting layout. A large, colourful play/pause button makes video control easy, and a dancing bunny animation appears during playback to add whimsy and delight. When a video finishes, confetti bursts and clapping sounds celebrate the user's progress, making each music completion feel rewarding.

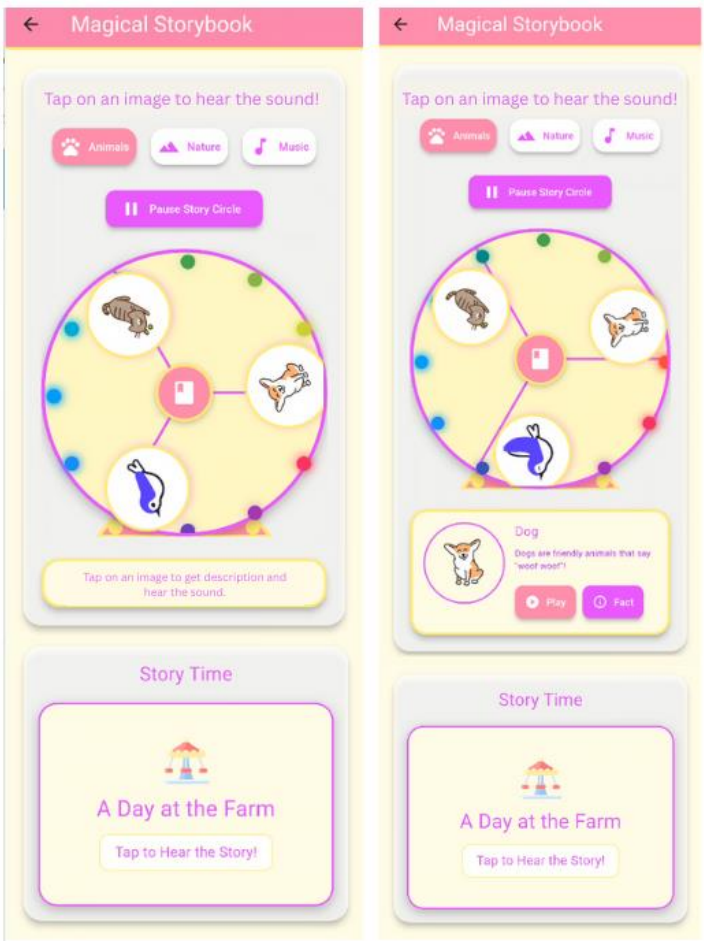


Figure 6.64 Listening Page

Figure 6.64 illustrates the Listening Page, which offers children a fun and interactive way to explore sounds and stories. Featuring a rotating wheel of sound tiles and a Storytime function, it creates a magical learning experience. The wheel spins gently to add a sense of wonder, but children can pause or resume it at any time. Using a bright and engaging design, the page lets young users explore sounds from animals, nature, and musical instruments. After selecting a category, a colourful wheel filled with playful images like animals or instruments appears. Each tile represents a sound; tapping it plays the audio, shows a fun fact, and triggers a cheerful animation.

Below the wheel, a special space called "Story Time" allows children to listen to short, entertaining stories based on their chosen sound category above. By tapping the tale card, they will hear a friendly narration interspersed with sound effects. For example, if they select animals, they may hear a farm story interspersed with animal sounds such as birds tweeting or cats meowing. These stories are short and vibrant, to spark children's imaginations while also teaching them about their surroundings.

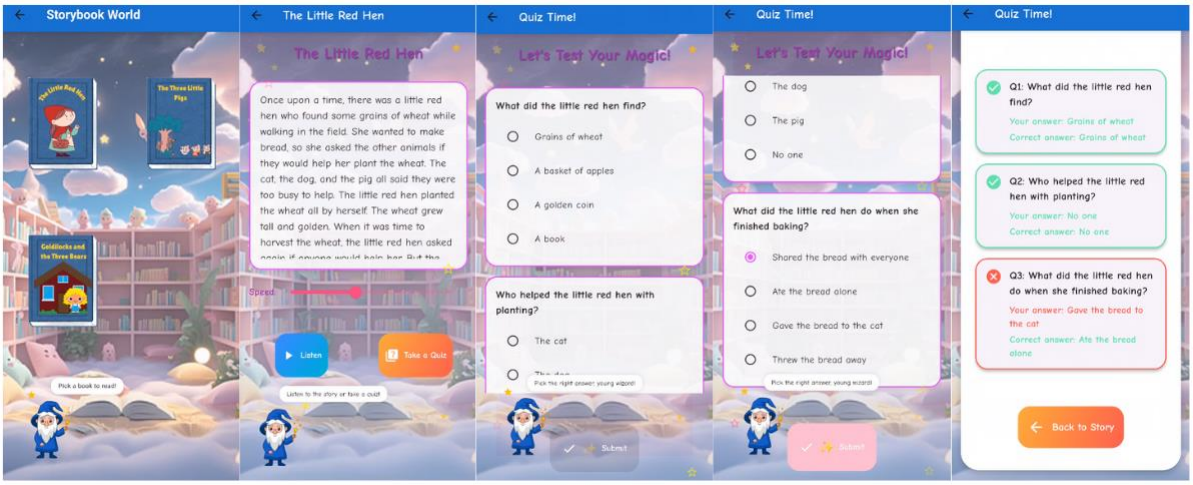


Figure 6.65 Reading Page, Detail Reading Page, Reading Quiz Page

Figure 6.65 depicts the Reading Page, Detail Reading Page, and Reading Quiz Page, all of which are intended to assist children in enjoying stories while also learning through quizzes. These pages combine to form a lovely fairytale world filled with vibrant colours, friendly characters, and playful animations.

The Reading Page encourages young people to select a storybook to read. They can choose from beloved stories such as The Little Red Hen, The Three Little Pigs, and Goldilocks and the Three Bears. Each narrative displays a bright card on the screen, gently floating to draw their attention. A cheery wizard character glides close and encourages them, saying, "Pick up a book to read!" The background depicts a comfortable library, contributing to the pleasant, storybook atmosphere. When a youngster taps on a tale, they are brought to the next page to read it in greater depth.

On the Detail Reading Page, children can read the entire narrative or listen to it read aloud. To make it easier to follow along, they can play, pause, or slow down the reading. They also have the option of taking a quiz about the tale they just read. Soft animations, colourful buttons, and

glittering stars add to the page's vivid and engaging feel. The helpful wizard returns to instruct them, saying, "Listen to the story or take a quiz!"

On the Reading Quiz Page, participants answer three straightforward questions regarding the story. After students finish and submit their answers, a cheerful results screen displays, showing how many questions, they answered correctly. Fun animations applaud their accomplishments, and kids can easily return to the story later.

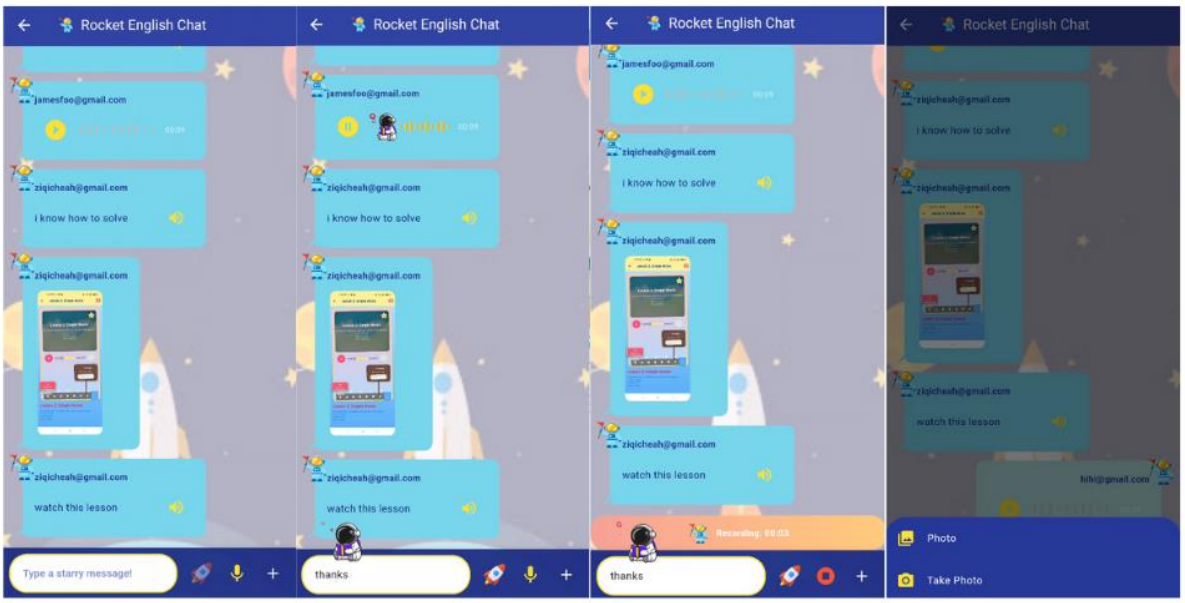


Figure 6.66 English Discussion Room Page

Figure 6.66 illustrates the English Discussion Room feature in the eLearning Wonderland app, a vibrant and interactive space for users to practice English through real-time conversations. Designed to build a sense of community, it allows learners to exchange text messages, voice recordings, and images in a playful, rocket-themed environment that encourages confidence and engagement.

The discussion room features a lively chat interface with a starry, space-inspired background and cloud-shaped message bubbles. Users can send text, record voice clips, and share photos, all enhanced by a bouncing robot avatar that adds charm. User messages appear in teal bubbles, while others are in cyan, creating a clear and visually appealing conversation flow.

Interactive tools make language practice enjoyable. Voice messages include animated waveforms and playback controls for pronunciation practice. Images can be uploaded directly and shared in the chat. A text-to-speech function reads messages aloud, supporting listening

and comprehension skills. These features offer varied ways for learners at all levels to engage with English.

The experience is further enriched with motivating feedback and animations. A rocket icon lights up when sending messages, and a robot avatar with a recording timer appears during voice clips. Lottie animations, such as a talking robot while typing, and celebratory confetti and sound effects, make participation fun and rewarding.

With its colourful design, versatile communication options, and engaging feedback, the English Discussion Room empowers users to build fluency in an enjoyable, collaborative setting. It fosters meaningful connections and inspires confidence, making it a standout feature of the eLearning Wonderland app.

Figure 6.67 English Game Page

Figure 6.67 depicts the English Game Page, which aims to capture users' interest and curiosity. It features a treasure map-inspired interface via which users may navigate to several game challenges, each of which is targeted to improve English skills in a fun and engaging way. Its interesting style and powerful graphics make learning seem like an exciting journey. The journey develops over a bright island map backdrop to inspire a sense of adventure. Colourful pins, each representing a distinct game such as "Enchanted Library" or "Word Blitz," are

dispersed around the map, accompanied by icons and labels indicating their educational game content. Clicking a map pin produces a sparkling shine effect and takes users to the desired game page.

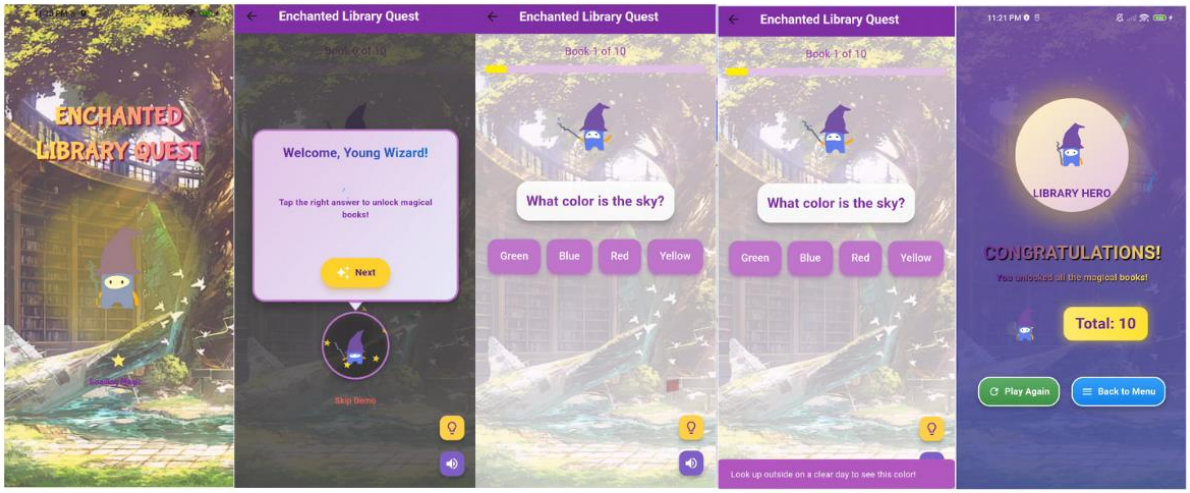


Figure 6.68 Enchanted Library Game Page

Figure 6.68 depicts the Enchanted Library Game Page, a fun educational game that helps young children learn early reading skills through a wonderful, wizard-themed experience. The game, set in a brilliant library with sparkling animations and guided by a friendly wizard mascot, asks players to answer multiple-choice questions to unlock magical books and become a "Library Hero."

Each session presents players with ten questions on general knowledge, such as identifying animals, colours, tools, and opposites. Before beginning, an interactive demo session shows how to select and answer questions. During playtime, kids select the correct answer from three or four possibilities and are immediately rewarded with happy sounds, confetti animations, and positive words. A hint button provides helpful hints, while bad answers generate gentle alerts and allow for penalty-free retries. To keep players engaged and excited, the game uses clear visuals, magical effects, and seamless animations. Hints and positive feedback encourage persistence and confidence.

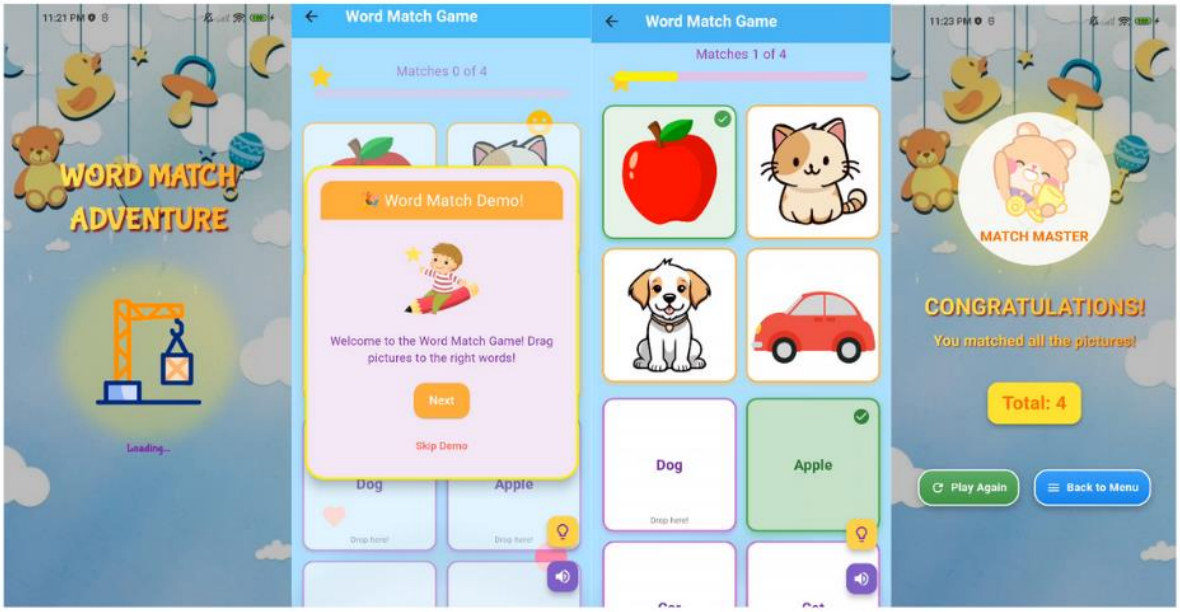


Figure 6.69 Word Match Adventure Game Page

Figure 6.69 depicts the Word Match Adventure Game Page, a colourful educational game that aims to improve young children's reading and cognitive skills through a fun word-to-image match. The game, set in a whimsical world and directed by a happy mascot, enables children to drag visuals like a kitten, dog, apple, or car to their corresponding phrases. Completing all four pairs grants them the title "Match Master."

The game begins with an interactive demo session that introduces how to play, ensuring children understand how to drag images to the matching words. Throughout the game, children receive immediate feedback with visual cues, cheerful sounds, and animations that celebrate correct matches. A progress bar helps players track how many pairs they have completed, while gentle prompts and retry options encourage persistence when mistakes are made. A hint button offers supportive guidance whenever needed, ensuring players feel confident and motivated.

An interactive demo introduces the gameplay and demonstrates how to confidently drag and match photos. Correct matches provide children with rapid feedback in the form of visual indicators, happy sounds, and celebration animations. A progress bar displays their completed pairs, while hints, mild prompts, and retry options promote perseverance and confidence.

This practice improves children's word recognition, vocabulary, and listening skills by integrating visuals, written words, and audio pronunciations. It also improves visual

discrimination, logical reasoning, and numerical skills as kids track their progress and complete matches in an engaging, supportive setting.

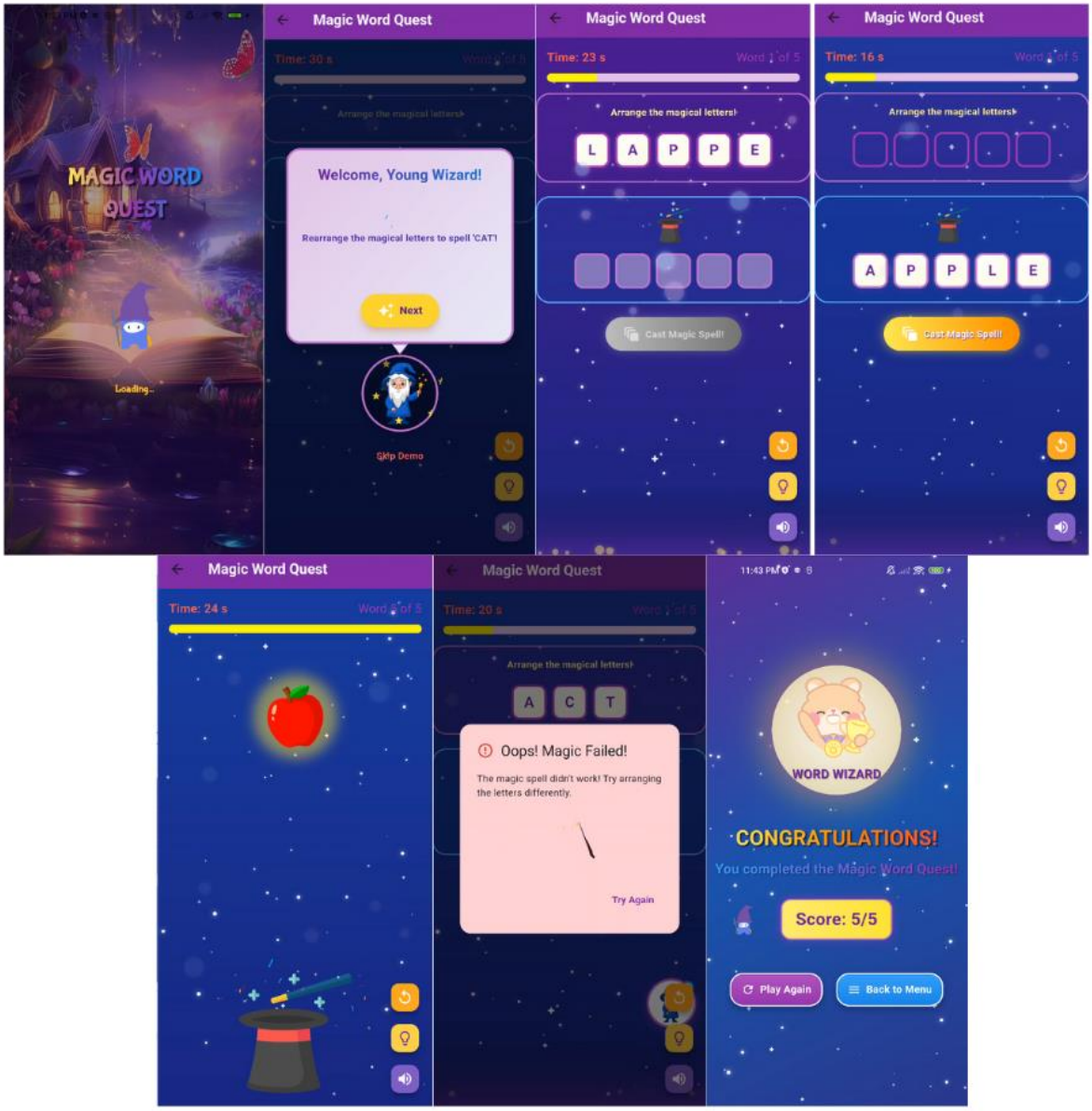


Figure 6.70 Magic Word Game Page

Figure 6.70 depicts the Magic Word Game Page, an interactive word-building game that helps kindergarten kids improve their vocabulary, spelling, and word recognition. In a mystical world, players assemble scrambled letters to accurately spell words like "CAT," "APPLE," and "SUN" within time limits. A guided lesson explains how to drag and drop letters into the appropriate positions. Children are rewarded for each accurate word with animations, musical effects, and a relevant graphic to reinforce meaning. A hint button helps when needed, while a countdown timer promotes concentration and quick thinking. By actively constructing words,

players improve their spelling accuracy, letter-sound correspondence, and vocabulary recall in a playful setting. The celebratory completion screen after finishing all words builds confidence and reinforces the joy of learning English.

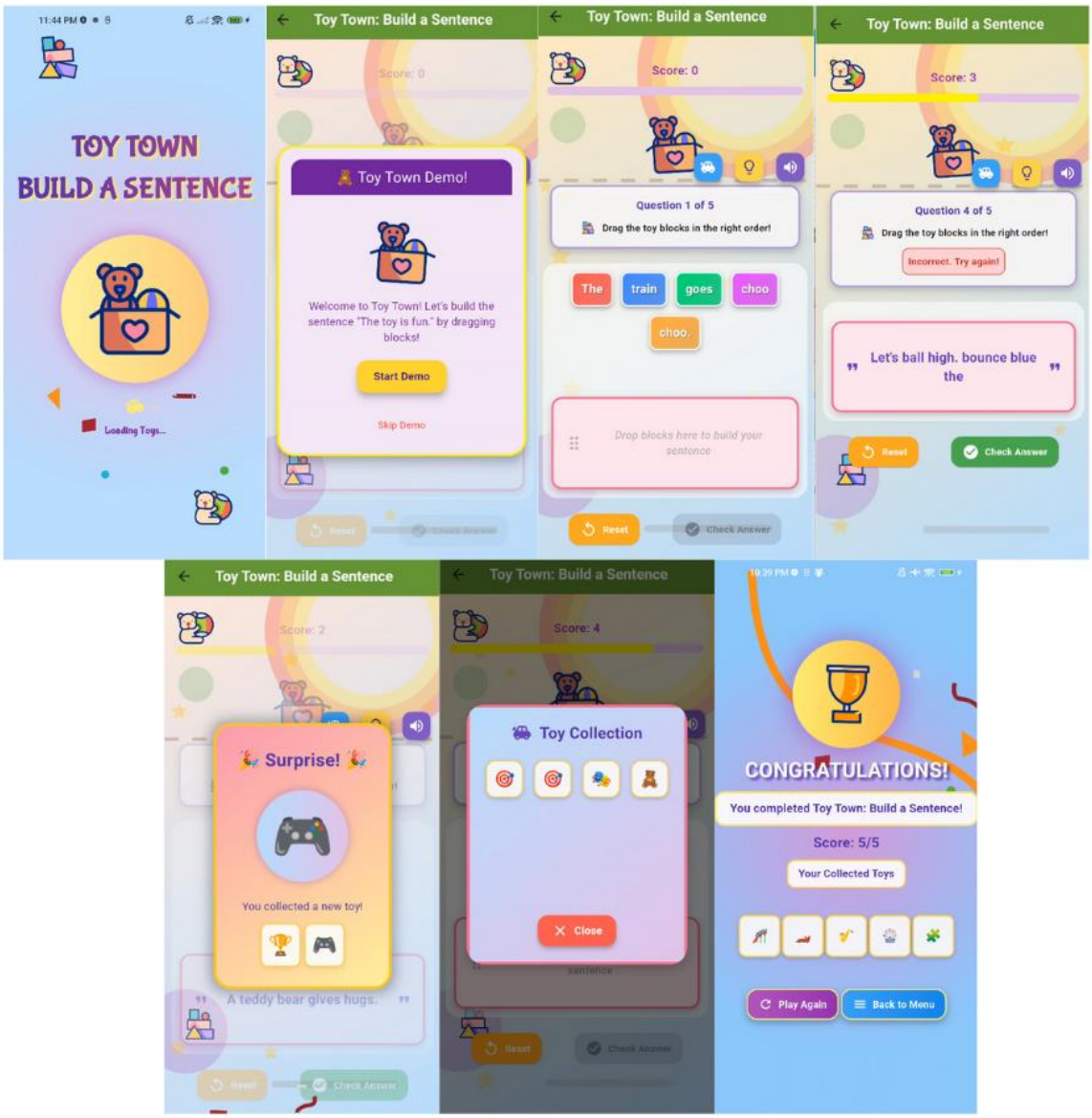


Figure 6.71 Toy Town Sentence Builder Game Page

Figure 6.71 depicts the Toy Town Sentence Builder Game Page, an interactive educational game for young children that aims to improve their early literacy skills. Set in a colourful and entertaining toy town, the game encourages kindergarten kids to construct grammatically proper phrases by arranging word blocks in the proper order. As players complete activities, they are awarded with virtual toys and stickers, which promotes a sense of accomplishment and drive.

To create entire sentences, players drag & drop word blocks into the designated sentence space. A progress bar keeps track of their progress, while helpful reminders, cheery audio cues, and visual feedback direct them along the way. Correct answers are rewarded with animations, confetti, and toys, resulting in an enjoyable and stimulating learning environment. To enhance gameplay, the game includes two helpful features. The hint button offers valuable clues, such as identifying the first or last word in a sentence, supported by audio and visual cues. The toy collection icon allows players to view the toys they have collected as rewards, such as teddy bears and trains, providing additional motivation to continue progressing through the levels. In addition to developing literacy skills such as sentence structure, grammar, vocabulary, and word recognition, the game also promotes cognitive abilities like sequencing and logical reasoning.

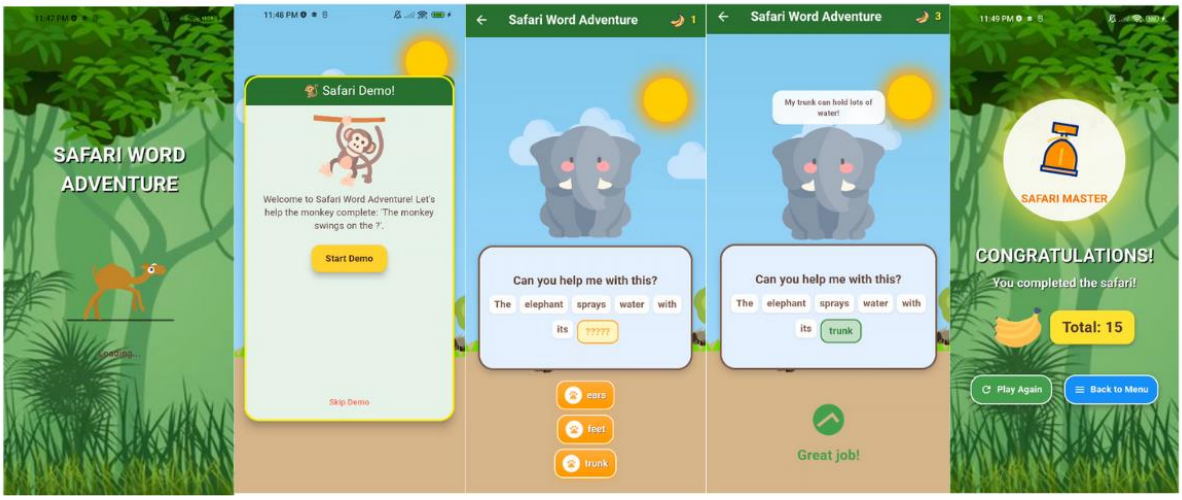


Figure 6.72 Safari World Adventure Game Page

Figure 6.72 depicts the Safari Word Adventure Game Page, an educational game that aims to improve young children's literacy skills through an interactive sentence-completion activity. The game is set in a beautiful safari scene, with a blue gradient sky, trees, bushes, and animated animals. Players compose sentences by selecting the appropriate word from a list of alternatives. The game contains five animal-themed questions depicting a monkey, elephant, giraffe, lion, and zebra. It helps youngsters enhance their vocabulary, sentence construction, and context comprehension. Correct answers disclose the animal's name and play the corresponding animal sound, and a sentence describing the characteristic of the animals, encouraging both word recognition and auditory learning.

Audio components, such as text-to-speech narration and animal sound effects, improve the interactive experience. Immediate feedback from pleasant animations and sounds keeps players interested and encouraged. After answering all five questions correctly, players collect bananas and receive the title of "Safari Master". A guided demo option explains the gameplay fundamentals, allowing children to feel competent before beginning the main game.

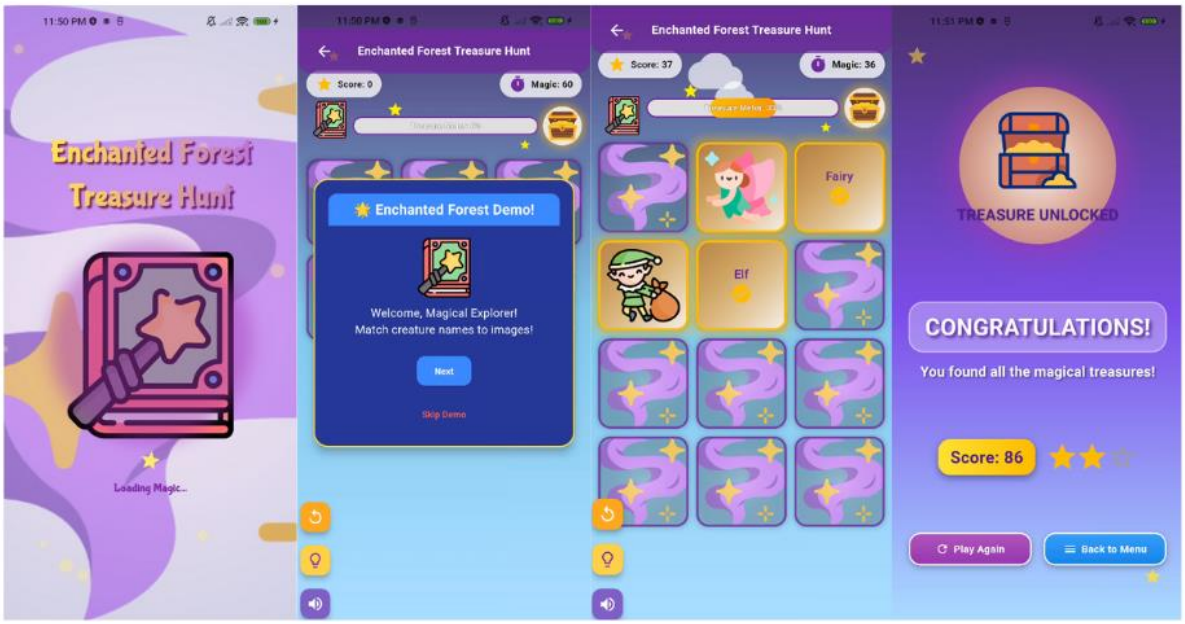


Figure 6.73 Enchanted Forest Treasure Match Game Page

Figure 6.73 depicts the Enchanted Forest Treasure Match Game Page, which promotes early cognitive development in young children. The game, set in a mystical woodland, challenges players to match the names of mythical creatures to their corresponding photos on a 3x4 grid within 60 seconds. Successful matches unlock treasure chests, earn points, and receive stars based on performance. The game promotes word recognition and vocabulary by having youngsters link text cards with illustrations of mythical creatures. It also improves reading comprehension by connecting words with visual representations. An engaging learning environment is created with vibrant visuals, animations, and auditory feedback, all directed by a sympathetic fairy character. Hints and auditory cues help ensure a great experience. Enchanted Forest Treasure Match promotes confidence, perseverance, and critical reading and cognitive skills in a fun and interactive way through intuitive gaming, rewarding development, and encouraging feedback.

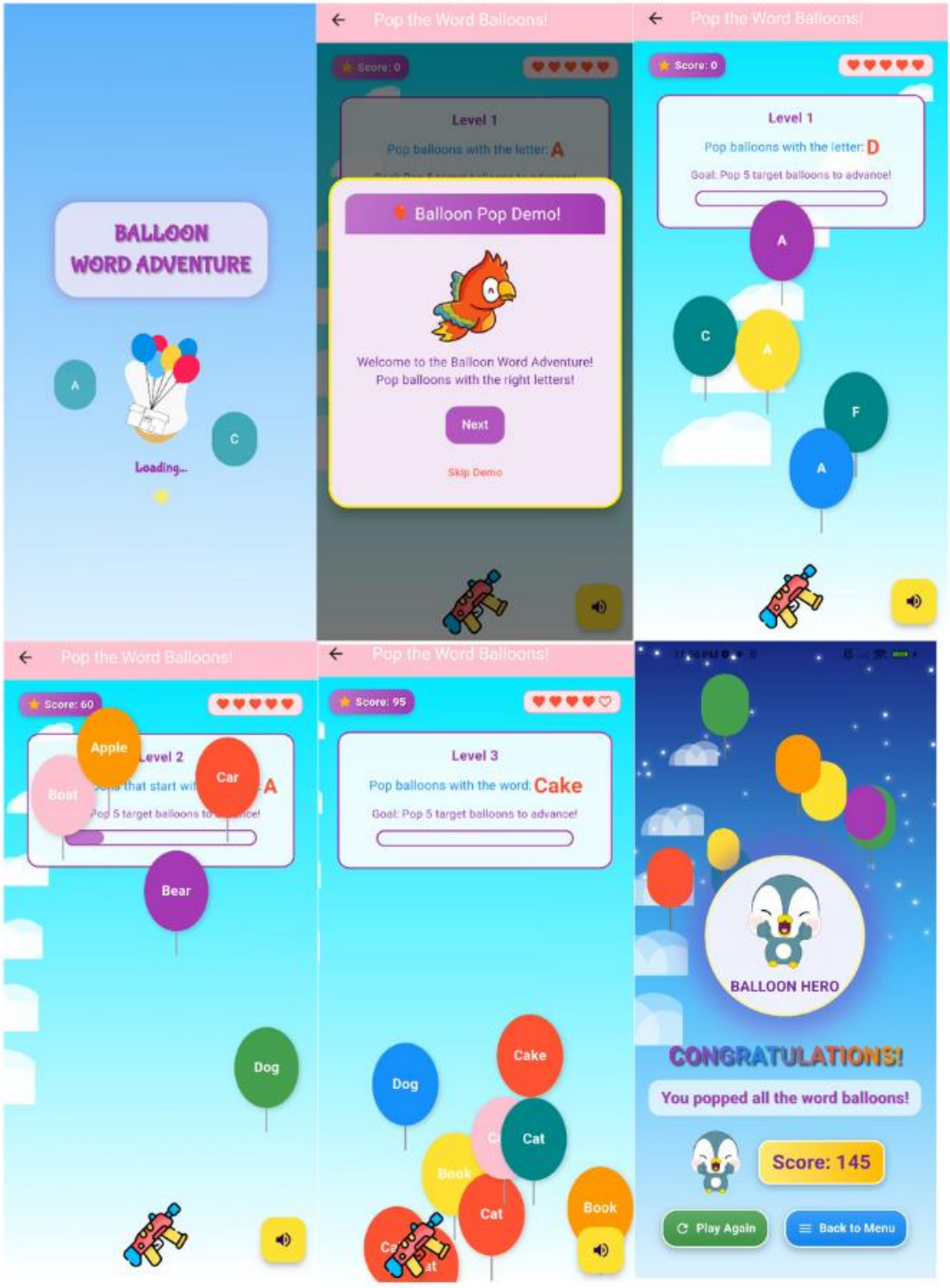


Figure 6.74 Balloon Word Adventure Game Page

Figure 6.74 illustrates the Balloon Word Adventure Game Page, a lively educational game that helps children develop letter recognition and vocabulary. Set in a colourful outdoor scene filled with balloons, players pop balloons that match target letters or words across three progressive levels. Level 1 focuses on identifying letters, Level 2 on recognizing words that start with a

specific letter, and Level 3 on matching exact words. A guided demo session introduces gameplay step by step, ensuring players feel confident before starting. Clear voice instructions, cheerful music, and engaging sound effects support players throughout the game. By popping the correct balloons, children strengthen phonics skills, initial sound awareness, and word recognition. Immediate feedback, such as confetti animations and positive sounds, reinforces learning and keeps players motivated. Gentle prompts encourage resilience by allowing children to correct mistakes. As the game progresses, the pace increases, promoting faster recall and sustained attention. A final congratulatory screen celebrates achievements, making English practice both enjoyable and rewarding.

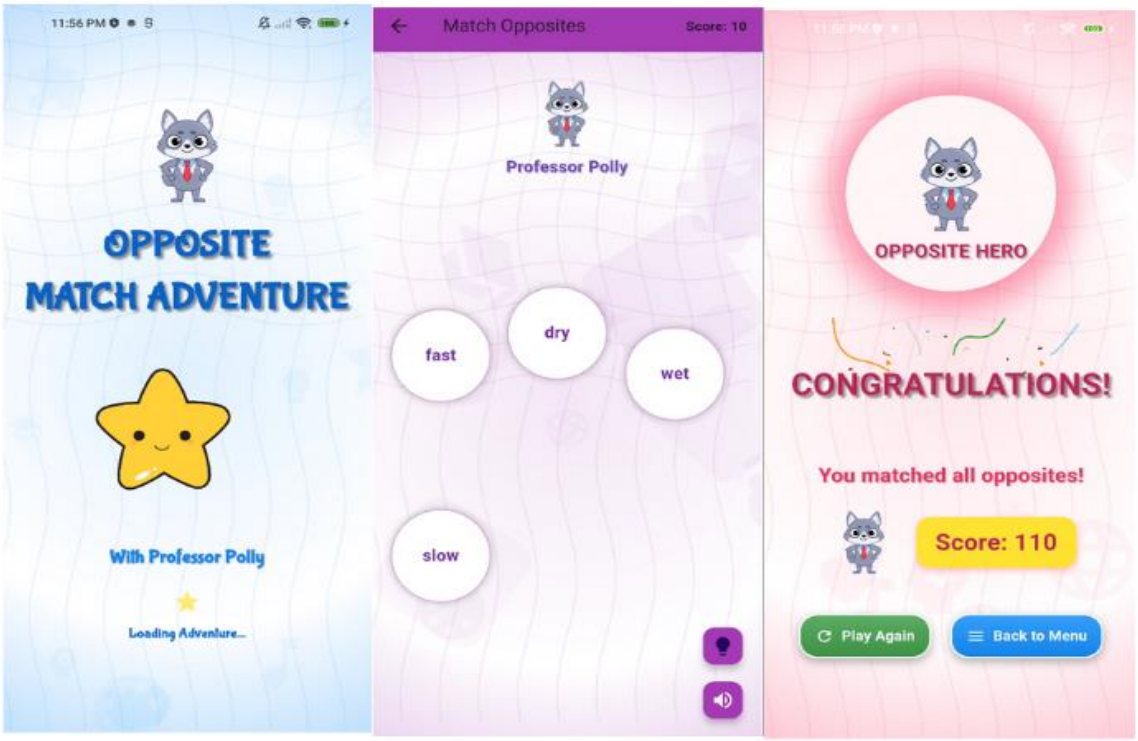


Figure 6.75 Opposite Word Match Game Page

Figure 6.75 illustrates the Opposite Match Game Page, an interactive game designed to enhance early literacy and cognitive skills through an opposites-matching challenge. Guided by Professor Polly, players match pairs of antonyms—such as "hot" and "cold"—across five progressively challenging levels. As players advance, each level introduces an increasing number of word pairs, gradually expanding the difficulty to support cognitive development and vocabulary growth. The game features vibrant visuals with floating word bubbles, animations, and audio guidance to create an engaging experience. Players tap word bubbles to match antonyms in categories like temperature, size, emotions, length, sound, brightness, age,

cleanliness, moisture, and so on. Correct matches earn points and advance players toward the title of "Opposite Hero." Positive feedback through animations, sound effects, and text-to-speech prompts keeps players motivated. Hints, retries, and a guided tutorial ensure smooth gameplay. Overall, Opposite Match Adventure provides a playful and rewarding way for children to strengthen vocabulary, antonym recognition, and categorization skills.

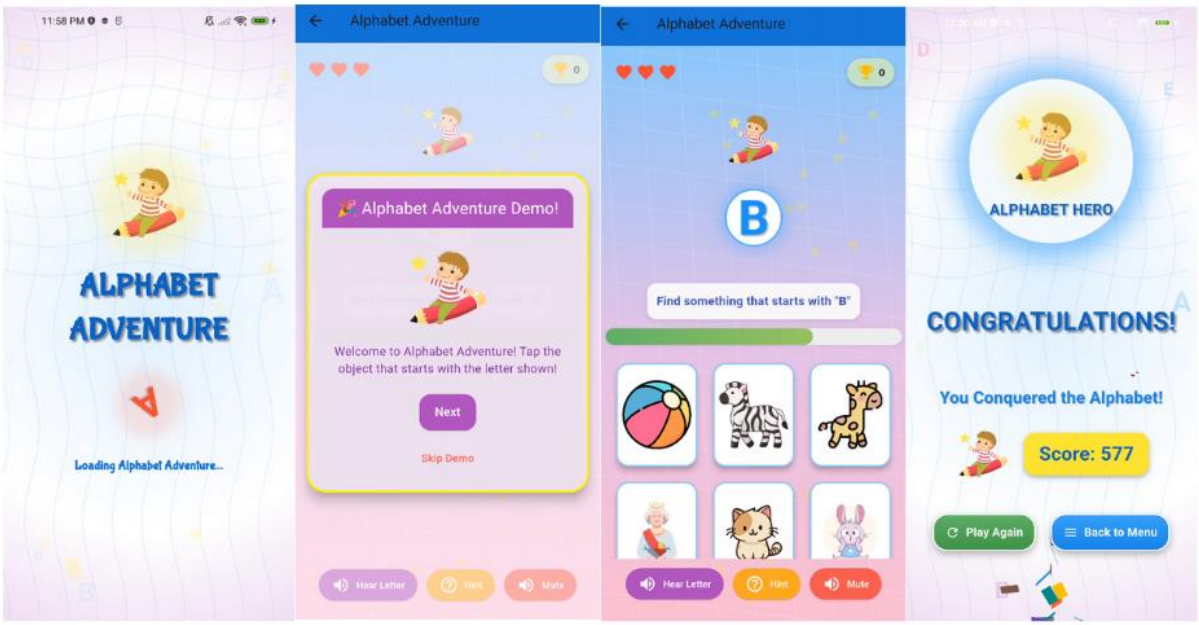


Figure 6.76 Alphabet Adventure Game Page

Figure 6.76 illustrates the Alphabet Adventure Game Page, an interactive educational game designed to help young children develop essential literacy skills through letter-object matching, promoting letter recognition, phonics, and vocabulary development. Players match each letter of the alphabet (A-Z) to an object starting with that letter (e.g., "A" with "Apple") within a 30-second time limit. The game features vibrant visuals, an animated mascot, and a colourful environment to engage children. Key elements include a timer, scoring system, and feedback animations. An audio guide with text-to-speech supports players throughout.

6.2 Test Software

During this stage, the app undergoes thorough internal testing, which is carried out to ensure its functionality, usability, and overall performance. This phase primarily focused on unit testing and feature testing, verifying that individual components and specific features worked as intended before delivering the iteration for review.

Unit testing focused on ensuring that standalone components of the app, such as video players, quiz modules, and navigation buttons, operate correctly in isolation. This testing helped identify any issues early in the development process, ensuring that all components were individually reliable before integrating them into the complete system. By isolating and testing individual modules, we could identify defects early and address them before they compounded into more complex integration issues. Table 6.1 highlights a selection of the major unit tests conducted during development. While it does not encompass all unit tests executed, it showcases key tests that ensured core components functioned correctly.

Test ID	Unit Tested	Test Description	Expected Output	Actual Result	Status
UT-01	Filter Level Function	Test filtering function returns correct lessons/videos/practices for "Beginner" level.	List of items with level = "Beginner"	Correct list returned	Pass
UT-02	Video Player Controls	Test play(), pause(), seek() functions in isolation	Video state updates correctly	Controls worked correctly	Pass
UT-03	Calculate Lesson Video Progress	Test if it correctly calculates the video progress.	1. Correct progress calculation for valid duration. 2. Zero progress for zero duration. 3. Sets hasWatchedEnough when the threshold is reached. 4. Does not set hasWatchedEnough if already completed or already watched enough. 5. Correct edge case handling.	Passed all cases correctly	Pass
UT-04	Video Progress Tracker	Test save and retrieve the video progress timestamp function	Returns saved timestamp accurately	Progress retrieved correctly	Pass

UT-05	Motivational Message for Progress Values	Test if it returns the correct motivational message for different progress values, including edge cases and boundary values.	"Almost there!" for progress >= 0.85, "Halfway done!" for progress between 0.5 and < 0.85, "Keep going!" for progress < 0.5, handles negative and out-of-range values correctly.	Return all cases correctly	Pass
UT-06	Quiz Scoring Function	The test score calculation logic returns the correct score based on the input answers.	Correct score integer returned	Correct score integer returned	Pass
UT-07	Calculate Average Score	Tests average score calculation (empty list, normal list, null scores, single score)	Returns correct average score as double (0.0, 5.0, 4.0, 8.0)	Correct average score returned	Pass
UT-08	Calculate Score Improvement	Tests score improvement calculation (few scores, positive/negative improvement, null score)	Returns correct improvement as double (0.0, 3.0, -3.0, 6.0)	Correct improvement value returned	Pass
UT-09	Shuffle Quiz Questions	Tests quiz shuffling logic (question count, answer preserved, answer Index updated, different shuffle)	Shuffled list with correct answer present and valid answer Index	Shuffle the quiz correctly	Pass
UT-10	Fun Points & Unlock Emoji Sticker	Verify that fun points are added, and emoji sticker unlocks as intended	Fun points increase, and a new sticker unlocks	Fun points increase, and a new sticker unlocks	Pass
UT-11	Hint Retrieval Function	Test getHint(questionId) returns the correct hint string	Returns the correct hint string	Correct hint returned	Pass

Table 6.1 Core Unit Testing

Feature testing extended beyond unit tests by validating that core functions, such as displaying a video lesson, answering quizzes, and navigating between screens, behaved as expected and aligned with user requirements. These tests ensured that individual components not only worked on their own but also integrated correctly within the full system. Key aspects tested

included user interactions, data flow between modules, and visual feedback, ensuring the app provided a consistent and seamless experience for the end user.

In addition, during development iterations, **formative usability testing** was performed to guide interface improvements at an early stage. Informal testing sessions were conducted with a small group of kindergarten-aged children on specific features and UI elements, such as navigating lessons, interacting with buttons, and completing quizzes. Insights from these sessions informed refinements in button sizes, icon clarity, and layout adjustments to better suit the motor skills and cognitive abilities of the target audience.

The iterative and continuous testing process played a crucial role in ensuring that the app's core features, including video lessons, quiz modules, and interactive elements, functioned as expected. Unit testing allowed for the verification of individual components in isolation, while feature testing ensured that these components interacted seamlessly. Usability testing helped fine-tune the app's interface to make it more intuitive for young users.

By conducting these tests early and iteratively, we were able to identify and resolve issues as they arose, building confidence in the stability and functionality of the app. This comprehensive testing process laid a strong foundation for the subsequent integration of all features, leading to a more reliable and user-friendly experience in the final version of the application.

6.3 Deliver Iteration

Following successful internal testing and validation, new or modified functionality is released as an app iteration. While the app has not yet been publicly released, this iteration provided key stakeholders with access to the app's latest features and improvements. Incremental updates allowed for continual enhancements, ensuring that each new iteration met quality, performance, and usability standards before being considered for future deployment. The feedback gathered from internal stakeholders during this phase will play a vital role in refining the app before any potential public release.

6.3.1 Implementation Issues and Challenges

Creating a kindergarten e-learning app with Flutter and Dart presents unique challenges, mainly when designing the user experience and operations suitable for kindergarten-aged children. Unlike adult apps, the interface for young users who have just started learning digital literacy must be straightforward, entertaining, and accessible. This necessitates careful consideration of the visual appeal, behavioural patterns, and material delivery to ensure that the app is easy to use and appropriate for young children's cognitive and thinking skills. The **user interface** must be simple, visually appealing, and easy for children to navigate. This requires designing with a focus on large, colourful buttons, clear icons, and a consistent layout to minimize confusion.

Another critical problem is the creation of **educational resources**. An extensive knowledge of early childhood education ideas is required to create academic and enjoyable content such as videos, songs, and interactive lessons. Furthermore, developing these resources individually adds to the complexity by requiring creativity, technical abilities in multimedia production, and apparent compatibility with the educational goals. The app's effectiveness depends on ensuring the material is age-appropriate, entertaining, and connected to learning outcomes.

Besides, the app must accommodate **various learning speeds and abilities**. Designing educational content for example, videos, quizzes, interactive lessons that is both age-appropriate and cognitively suitable for kindergarten-aged children is challenging. Furthermore, the app must be flexible enough to adapt to the child’s progress through dynamic content and difficulty adjustments.

Additionally, the **performance** of the app, especially when dealing with multimedia elements like videos, animations, and sound, needs to be optimized. Children expect quick response times and smooth transitions. **Optimization**, both in terms of app speed and memory usage, becomes a challenge, particularly with complex media content and interactivity.

6.4 Gather feedback

Following each iteration delivery, feedback is gathered from key stakeholders, including instructors, parents, and students. This feedback is essential for evaluating the success of existing features, identifying potential areas for improvement, and guiding future development

cycles. It helps ensure that the app evolves based on the actual needs, preferences, and behaviours of its users, leading to more informed decision-making in subsequent iterations. By incorporating this user input, the development team can fine-tune the app's functionality and user experience to better align with educational goals and enhance overall usability.

6.5 Chapter Summary

This chapter outlines the iteration phase, where the project transitions from design to development. The team converted finalized designs and wireframes into functional code, building both the front-end and back-end. All intended features were integrated into the app.

Using Agile iterations, features were incrementally developed and refined to meet the needs of young learners and instructors. Two major iterations were completed: the first version and the final version. The iteration process followed five key stages: planning requirements, developing the product, testing the software, delivering the iteration, and gathering feedback for continuous improvement.

Chapter 7

Product Release and Deployment

During this phase, the fully integrated application undergoes system-level testing, quality assurance, user training, and documentation preparation. While unit testing and feature testing have been continuously performed throughout development iterations, this stage focuses on validating that all features work seamlessly together as a complete product.

Comprehensive functional testing ensures that interactive components, dashboards, and alert systems perform reliably. Additionally, usability testing sessions with target users (kindergarteners) are conducted to confirm the app's ease of use and overall user experience. These final validations ensure the product meets quality standards and is ready for release.

7.1 System Testing and Results

At this stage, system testing was performed to evaluate the entire application as a fully integrated product. The end-to-end functional testing and usability testing were conducted to ensure that all components function cohesively to deliver a seamless and reliable user experience.

7.1.1 End-to-End Functional Testing

End-to-end functional testing was conducted to validate that all major workflows of the Kindergarten E-learning application operate seamlessly when integrated as a complete system. The objective of this testing was to simulate real user interactions, ensuring that key features and processes function correctly from the initial user action to the final expected outcome.

The testing covered essential user journeys, such as account authentication, accessing and completing lessons, participating in quizzes, and tracking learning progress. Each test scenario was manually executed to confirm that all components—including frontend interfaces, backend services, and database interactions- worked together as intended. The results of the end-to-end functional testing are summarized in Table 7.1.

Test Scenario	Test Steps	Expected Result	Actual Result	Status
User Authentication with Splash Screen and Intro Screen	1. Open the app for the first time. 2. Observe the splash screen. 3. Verify that the intro screen displays. 4. Swipe to view the second page of the intro screen. 5. Click the "Jump" button. 6. Verify navigation to the login screen. 7. Return to the intro screen and tap "Let's Start". 8. Verify navigation to the login screen. 9. Open the app as a returning user (valid token present). 10. Verify intro screen is skipped (splash → login or homepage). 11. Enter valid credentials and tap "Login". 12. Attempt to log in with invalid credentials.	**First-time user (no token)**: The splash screen displays briefly with animation. The intro screen shows 2 pages. Swiping between pages works with animation indicators. Clicking "Jump" or "Let's Start" navigates to the Login screen. **Returning user (token present)**: Splash screen displays. The intro screen is skipped. The app navigates directly to the Homepage. **Login:** Valid credentials, then navigates to the Homepage. If Invalid credentials, then an invalid message is shown	**First-time user:** Splash screen and intro screens displayed correctly. Swiping and buttons worked as expected. Navigated to the Login screen. **Returning user:** Intro screen skipped. Navigated to Homepage directly. **Login:** Valid login navigated to Homepage. Invalid login showed the correct error message.	Pass
Homepage Feature Buttons Navigation	1. Log in as an authenticated user 2. On the Homepage, tap the **Math** button 3. Return to Homepage 4. Tap the **English** button 5. Return to Homepage	Homepage displays two large buttons (Math and English) in forms of doors. Tapping **Math** navigates to the Math section. Tapping **English** navigates to the English section.	Two buttons (Math, English) are displayed correctly. Navigation to both sections worked.	Pass

Bottom Navigation Bar Functionality	1. On the Homepage, observe the bottom bar 2. Tap each button: - **Home** - **Dashboard** - **Notification** - **Profile** 3. Return to Homepage	The bottom navigation bar features four icons: Home, Dashboard, Notification, and Profile. Clicking on the Home icon navigates to the homepage, the Dashboard icon opens the dashboard page, the Notification icon takes you to the notification page, and the Profile icon leads to the user's profile page. All navigation works seamlessly without any crashes.	The bottom bar showed 4 icons. All navigation worked.	Pass
Math Screen	1. On the Homepage, tap the **Math** door button 2. Observe the screen with 7-section buttons: - **Lesson** - **Quiz** - **Video** - **Music** - **Practice** - **Game** - **Discussion Room** 3. Tap each button one by one 4. Return to the Math screen after visiting each section	The math screen displays seven section buttons, each leading to the corresponding page. Clicking the Lesson button opens the Math Lesson screen, the Quiz button opens the Math Quiz screen, the Video button opens the Math Video screen, the Music button opens the Math Music screen, the Practice button opens the Math Practice screen, the Game button opens the Math Game screen, and the Discussion Room button opens the Math Discussion Room screen.	All 7 buttons displayed correctly. Navigation to each section worked as expected.	Pass
English Screen	1. On the Homepage, click the **English** door button	The English screen features eight section	The English category page loads	Pass

	2. Observe the screen with 7-section buttons: - **Lesson** - **Quiz** - **Video** - **Music** - **Reading** - **Listening** - **Game** - **Discussion Room** 3. Tap each button one by one 4. Return to the English screen after visiting each section	buttons, each navigating to the appropriate page. Clicking the Lesson button opens the English Lesson screen, the Quiz button opens the English Quiz screen, the Video button opens the English Video screen, the Music button opens the English Music screen, the Reading button opens the Reading screen, the Listening button opens the Listening screen, the Game button opens the English Game screen, and the Discussion Room button opens the English Discussion Room screen.	with all buttons as expected. Navigation to each section worked as expected.	
Math Lesson Interaction	1. On the Math Category Page, tap "Lessons." 2. On the Math Lesson Page, filter by "Beginner" and select a lesson. 3. On the Detail Math Lesson Page, play the video. 4. Watch until 85% completion and tap "Mark Done." 5. Navigate to the Detail Math Lesson Comment Page and post a voice comment.	The Math Lesson Page shows a train-themed interface with filter tabs. The video plays with a progress-tracking train animation. After 85% completion, "Mark Done" activates with confetti. The Comment Page loads with a bulletin board design, and the voice comment posts with waveform animation.	Lesson video, marking, and commenting work as expected.	Pass
Math Quiz Participation	1. On the Math Category Page, tap "Quizzes."	The Math Quiz Page displays a candy-themed	Quiz selection, answering, and	Pass

	2. On the Math Quiz Page, select an unlocked quiz. 3. On the Detail Math Quiz Page, answer all questions. 4. Submit the quiz and view results.	interface with glowing quiz buttons. Questions are answered via tappable options. Submitting shows a score with confetti for perfect scores and a performance chart.	results display correctly.	
Math Video Playback	1. On the Math Category Page, tap "Videos." 2. On the Math Video Page, filter by "Intermediate" and select a video. 3. On the Detail Math Video Page, play the video. 4. Add an emoji sticker and a comment. 5. Verify "fun points" increase. 6. Verify new emoji sticker appears.	The Math Video Page shows a retro TV-style interface with filter tabs. The video plays with controls for pause/speed. Stickers and comments appear with animations, and "fun points" update with a star icon animation, and a new emoji sticker will be unlocked when hitting the target fun points.	Video playback, stickers, and points update, new emoji sticker added as expected.	Pass
Math Music Lesson	1. On the Math Category Page, tap "Music." 2. On the Math Music Page, select a song. 3. On the Detail Math Music Page, play the video. 4. Complete the video and verify the confetti animation.	The Math Music Page shows a vibrant music player with a song list. The video plays with a dancing bunny animation. Tapping triggers a star icon, and completion shows confetti with a clapping sound.	The music video and interactions perform correctly.	Pass
Math Practice Activity	1. On the Math Category Page, tap "Practice." 2. On the Math Practice Page, select a "Beginner" activity.	The Math Practice Page shows a bunny hopping on platforms. The activity loads with four answer options. Correct answers trigger Lottie	Practice activity and results function as expected.	Pass

	3. On the Detail Math Practice Page, answer multiple-choice questions. 4. Submit and view results.	animations; incorrect ones show the correct answer. Results display with celebratory feedback.		
Math Game Page	1. On the Math Category Page, tap "Game." 2. Verify the Math Game Page loads with an island map. 3. Check for map pins representing games: Treasure Game, Star Challenge, Math Blitz, River Quest, Candy Shapes, Space Mission. 4. Tap each pin to verify navigation to the respective game. 5. Verify animations and interactivity of pins.	The Math Game Page loads with a pirate-themed island map background. Animated map pins for Treasure Game, Star Challenge, Math Blitz, River Quest, Candy Shapes, and Space Mission are displayed with glowing effects. Tapping a pin navigates to the corresponding game. Pins wobble or sparkle when tapped, enhancing interactivity.	The math game page and pins function correctly.	Pass
Math Discussion Room Interaction	1. On the Math Category Page, tap "Discussion Room." 2. On the Math Discussion Room Page, send a text message. 3. Record and send a voice message. 4. Upload an image. 5. Verify real-time message display.	The Discussion Room loads with a space-themed interface. Text and voice messages are sent with waveform animations, and images are uploaded successfully. Messages from others appear in real-time with sender attribution.	The discussion room messaging functions correctly.	Pass
English Lesson Interaction	1. On the English Category Page, tap "Lessons." 2. On the English Lesson Page, filter by	The English Lesson Page shows an airplane-themed interface with filter tabs. The video plays with a runway progress bar. After 85%	The English lesson video and commenting work as expected.	Pass

	"Beginner" and select a lesson. 3. On the Detail English Lesson Page, play the video. 4. Watch until 85% completion and tap "Mark Done." 5. Navigate to the English Lesson Comment Page and post a text comment.	completion, "Mark Done" activates with confetti. The Comment Page loads with a boarding pass design, and the comment posts successfully.		
English Quiz Participation	1. On the English Category Page, tap "Quizzes." 2. On the English Quiz Page, select an unlocked quiz. 3. On the Detail English Quiz Page, answer all questions. 4. Submit the quiz and view results on the English Quiz Analytic Page.	The English Quiz Page displays a candy-themed interface with glowing quiz buttons. Questions are answered via tappable options. Submitting shows a score with confetti for perfect scores and a performance chart.	The English quiz and results display correctly.	Pass
English Video Playback	1. On the English Category Page, tap "Videos." 2. On the English Video Page, filter by "Advanced" and select a video. 3. On the Detail English Video Page, play the video. 4. Add an emoji sticker and a comment. 5. Verify "fun points" increase.	The English Video Page shows a retro TV-style interface with filter tabs. The video plays with controls for pause/speed. Stickers and comments appear with animations, and "fun points" update with a star icon animation.	English video playback and points update as expected.	Pass

English Music Lesson	1. On the English Category Page, tap "Music." 2. On the English Music Page, select a song. 3. On the Detail English Music Page, play the video. 4. Complete the video and verify the confetti animation.	The English Music Page shows a sunny interface with a song list. The video plays with a dancing bunny animation. Tapping triggers a star icon, and completion shows confetti with a clapping sound.	English music video and interactions perform correctly.	Pass
English Listening Activity	1. On the English Category Page, tap "Listening." 2. Select a listening category 3. Click on the images to play the audio. 4. Click on the storybook. 5. Listen to the storybook	The Listening activity loads with an audio player. Soundtrack audio and story audio play smoothly.	The listening activity played as expected.	Pass
English Reading Activity	1. On the English Category Page, tap "Reading." 2. Verify the storybook grid shows 3 storybook cards. 3. Verify the floating wizard animation is displayed, with a speech bubble that says "Pick a book to read!" 4. Tap on the Little Red Hen storybook card. 5. Verify the app navigates to the Reading Detail Page with the correct story content (title,	The English Reading Page displays exactly three storybook cards along with a visible floating wizard animation that says, "Pick a book to read!" Tapping on any storybook card correctly navigates to the Reading Detail Page, which shows the matching title, description, story text, and image for the selected story. The story audio plays and pauses as expected when interacting with the Play/Pause button. After	Three storybooks and the wizard appear. Story details display correctly. Audio plays/pauses. Quiz opens, submits, and shows score with confetti.	Pass

	description, story text, and image). 6. Click on the Play/Pause button to listen and read the story 7. Click on the "Take Quiz" button to navigate to the reading quiz. 8. Submit the quiz. 9. Verify the score and confetti animation.	tapping "Take Quiz," the app successfully navigates to the reading quiz page. Upon submission of the quiz, the score is shown, and a confetti animation plays to indicate feedback. All reading activities, navigation, and feedback animations function correctly and smoothly throughout the flow.		
English Game Page	1. On the English Category Page, tap "Game." 2. Verify the English Game Page loads with an island map. 3. Check for map pins representing games: Enchanted Library Quest, Safari Word Adventure, Enchanted Forest Treasure Hunt, Toy Town: Build a Sentence, Pop the Word Balloons! 4. Tap each pin to verify navigation to the respective game. 5. Verify animations and interactivity of pins.	The English Game Page loads with a magical library-themed island map background. Animated map pins for Enchanted Library Quest, Safari Word Adventure, Enchanted Forest Treasure Hunt, Toy Town: Build a Sentence, and Pop the Word Balloons! are displayed with sparkling effects. Tapping a pin navigates to the corresponding game. Pins wobble or glow when tapped, enhancing interactivity.	The English game page and the pins function correctly.	Pass
English Discussion Room Interaction	1. On the English Category Page, tap "Discussion Room." 2. On the English Discussion Room Page, send a text message.	The Discussion Room loads with a rocket-themed interface. Text and voice messages send with waveform animations, and images	The English discussion room messaging functions correctly.	Pass

	3. Record and send a voice message. 4. Upload an image. 5. Verify real-time message display.	upload successfully. Messages from others appear in real-time with sender attribution.		
Progress Tracking Dashboard	1. From the homepage, tap the Dashboard button in the bottom navigation bar. 2. View the child's progress for Math and English activities. 3. Tap a specific subject tab button for detailed insights.	The dashboard displays an overview of completed lessons, quiz scores, and activity time for Math and English. Tapping an activity shows details like score and duration, with clear visualizations.	Dashboard and progress tracking work as expected.	Pass
Notification System	1. From the homepage, tap the Notifications button in the bottom navigation bar. 2. Check for scheduled reminders in the calendar view. 3. View the reminder list for a date. 4. Add a notification 5. Check whether it shows in the list. 6. Verify push notification receipt on the device.	The calendar view shows scheduled activities with reminders. Tapping a notification displays session details (e.g., time, subject). Push notifications appear on the device for upcoming sessions.	Notifications and calendar view function correctly.	Pass
Profile Management	1. From the homepage, tap the Profile button in the bottom navigation bar. 2. On the Account Screen, tap the edit button. 3. On the Edit Profile Page, update the user's name and select a new avatar.	The Account Screen shows user details with a confetti effect. The Edit Profile Page allows name and avatar updates. Saving changes shows a success message with confetti.	Profile page shows information, editing, and updates perform correctly.	Pass

	4. Save changes and verify the updated profile.			
Logout Functionality	1. From the homepage, tap the Profile button in the bottom navigation bar. 2. On the Account Screen, tap the "Bye Bye!" logout button. 3. Confirm logout if prompted.	The app logs out the user and returns to the login screen. A confirmation prompt (if implemented) appears before logout.	Logout functionality works as expected.	Pass

Table 7.1 End-to-end Testing

7.1.2 Summative Usability Testing

At the release phase, **summative usability testing** was conducted on the fully integrated application to validate the overall user experience. The primary goal was to assess the clarity, intuitiveness, and accessibility of the app's design, ensuring it aligns with the cognitive and developmental abilities of young children. The test focused on how easily children could interact with key User Interface elements, such as buttons, icons, and navigation tools, and whether they were able to independently navigate through lessons, videos, and quizzes with minimal assistance. Observations were made on the ease with which the children could engage with content, as well as their ability to complete tasks such as starting videos, selecting lessons, and participating in quizzes without confusion. This testing validated the app's suitability for its target audience, ensuring that the design was both child-friendly and effective in supporting the learning experience.

7.2 Objectives Evaluation

The "My Little Learner: E-Learning Wonderland" project has successfully fulfilled all its defined objectives, delivering a robust and innovative kindergarten e-learning platform that addresses the educational needs of young learners, parents, and educators. The following evaluation provides a clear and detailed assessment of how each objective was met, supported by evidence from development outcomes, testing results, and stakeholder feedback.

The objective of **creating a highly engaging e-learning environment** was accomplished through a thoughtful combination of interactive features, intuitive user interface (UI) design, and motivating functionalities that captivate young learners. The platform incorporates a variety of elements such as animated lessons, interactive quizzes, storytelling, music-based activities, and a reward system featuring virtual stickers, badges, and celebratory animations. For instance, the Math Lesson Page uses a playful train-themed interface with vibrant visuals and a moving train to guide children through lessons, while the English Music Page integrates lively songs with dancing bunny animations to maintain interest. The UI design prioritizes simplicity and visual appeal, with bright colour schemes, rounded buttons, and smooth transitions that align with the cognitive abilities of kindergarten-aged children. Features like confetti bursts upon task completion and dynamic tooltips further enhance engagement by providing instant feedback and encouragement. Usability testing with kindergarten children confirmed that these elements were intuitive and enjoyable, as participants navigated lessons and activities with minimal guidance and expressed excitement through positive reactions to animations and rewards. Stakeholder feedback highlighted the platform's ability to sustain attention and foster a positive attitude toward learning, fulfilling the goal of creating an immersive and motivating educational experience.

The objective of **providing a comprehensive dashboard** for students was achieved by implementing a sophisticated, user-friendly interface that delivers detailed and actionable insights into a student's learning journey. Integrated seamlessly within the app, the dashboard serves as a centralized hub displaying key metrics such as lesson completion rates, earned quiz badges, and progress toward learning milestones. It features visual aids like progress charts and summary tables that showcase completed lessons, their respective difficulty levels, and the collection of virtual badges earned through quiz achievements, such as perfect scores in the Math Quiz Page. For example, a progress chart visually tracks the number of lessons completed over time, while a badge gallery highlights rewards earned, reinforcing motivation. These elements provide insights into a kid's strengths, such as consistent lesson completion, and areas for improvement, like gaps in specific subject engagement, enabling a tailored learning approach. The dashboard also includes a goal-tracking section where students can monitor their advancement toward earning additional badges, further incentivizing engagement. Internal testing validated the dashboard's functionality, confirming accurate data retrieval from the Firebase backend and intuitive navigation with no reported errors. Stakeholder feedback during

the iteration phase praised the dashboard's clarity and motivational impact, noting that the visibility of badges and progress metrics encouraged students to stay committed to their learning goals. By offering these granular insights and motivational tools, the dashboard empowers users to monitor and enhance their educational experience, directly contributing to the objective of improving learning outcomes through informed and engaging progress tracking.

The objective of **maintaining consistent learning routines through a reminder notification system** was successfully met by implementing a flexible and user-defined calendar-view notification system tailored to support young learners in sustaining regular engagement with educational content. The system allows users to customize and schedule notifications for various activities, such as lessons, quizzes, or new content exploration, through an intuitive calendar interface that provides a clear overview of upcoming tasks. For instance, a user can set a reminder for a specific math lesson on the Math Lesson Page or schedule a quiz session on the English Quiz Page, aligning notifications with their preferred learning routine. These user-defined reminders are delivered as timely push notifications, featuring playful visuals and simple, age-appropriate language to ensure accessibility for kindergarten-aged children. The notifications act as gentle prompts to encourage children to engage with their scheduled activities, addressing the challenge of maintaining focus and consistency in young learners who may have developing time-management skills. System testing confirmed the reliability, punctuality, and customization capabilities of the notification system, with alerts delivered accurately across devices without delays or errors, and user inputs for scheduling preserved correctly in the Firebase backend. Usability testing with kindergarten children demonstrated that the notifications were easily understood and effective in prompting action, with children responding to reminders by initiating scheduled lessons or quizzes. Stakeholder feedback, including input from parents, highlighted that the ability to personalize notifications significantly improved children's adherence to learning schedules, reducing instances of missed or forgotten activities. By empowering users to define their reminders and fostering regular interaction with the platform, the notification system directly supports the objective of ensuring sustained educational progress for young learners.

The project fulfilled its goal of **accommodating diverse learning preferences** by incorporating a wide range of instructional methods, including interactive quizzes, audiovisual content, storytelling, music, and hands-on activities. For instance, the English Video Page

supports visual and auditory learners with dynamic video lessons and emoji-based interactions. The text-to-speech functionality, implemented across English-language pages, further enhances accessibility for auditory learners by providing spoken content, such as lesson narratives and quiz instructions. Usability testing with a small group of kindergarten children demonstrated that these varied approaches were inclusive and engaging, enabling all learners to interact effectively with the content and enhancing the overall educational experience.

The last objective of fostering peer-to-peer engagement was achieved through the **integration of collaborative discussion rooms**, such as the Math Discussion Room and English Discussion Room. These spaces replicate the social dynamics of physical classrooms, enabling children to communicate via text, voice recordings, and image sharing. Interactive elements, such as animated waveforms for voice messages and text-to-speech functionality, which converts text-based messages into spoken words, supporting young learners' comprehension, enhance accessibility and engagement. Testing with young learners showed enthusiastic participation, with children actively sharing ideas and collaborating on tasks, confirming the rooms' success in promoting social skills and community building. Feedback from stakeholders underscored the value of these spaces in creating a holistic learning environment that extends beyond content delivery.

In summary, the "My Little Learner: E-Learning Wonderland" project has met all its objectives, culminating in the successful creation of a kindergarten e-learning app that delivers an engaging, accessible, and effective educational experience through meticulous development, rigorous testing, and iterative refinements based on stakeholder input. The platform's engaging interface, comprehensive dashboard, reliable notification system, support for diverse learning styles, and interactive social spaces collectively establish it as a valuable tool for advancing early childhood education in a digital context.

7.3 Chapter Summary

Chapter 7 of the "My Little Learner: E-Learning Wonderland" project documentation details the release and deployment phase of the kindergarten e-learning platform. It focuses on the systematic evaluation and testing processes that ensured the app's functionality, usability, and alignment with project objectives for young learners.

The chapter first describes system testing, which includes end-to-end functional tests to verify the seamless integration of features like user authentication, lesson navigation, quiz participation, and progress tracking. Detailed in Table 7.1, these tests confirmed that all workflows across the Math and English sections operated correctly, with no failures reported. Usability testing with kindergarten children further validated the app's child-friendly design, ensuring that UI elements, such as buttons, icons, and animations, were intuitive and engaging, allowing independent interaction with lessons, videos, and quizzes.

The chapter also evaluates the fulfilment of the project's five objectives: creating an engaging e-learning environment with interactive lessons and rewards, providing a comprehensive dashboard for tracking lesson progress and quiz badges, implementing a user-defined notification system to support consistent learning routines, accommodating diverse learning styles through varied instructional methods, and fostering social interaction via discussion rooms with text-to-speech features. Each objective was achieved, as evidenced by testing outcomes and stakeholder feedback, which praised the platform's ability to captivate and educate young users effectively.

In summary, Chapter 7 underscores the successful validation of the app through rigorous testing and objective achievement, confirming its readiness as a robust, accessible, and engaging e-learning tool for kindergarten education.

Chapter 8
Conclusion and Recommendations

8.1 Conclusion

The "My Little Learner: E-Learning Wonderland" project marks a significant milestone in redefining early childhood education through the development of an innovative kindergarten e-learning application. Designed to address the unique educational needs of young learners, this mobile platform, built using Flutter, Dart, and Firebase, creates a dynamic, engaging, and inclusive digital learning environment tailored specifically for kindergarten-aged children. The project was driven by a clear vision to overcome the shortcomings of existing e-learning platforms, such as limited engagement, inadequate parental involvement, lack of consistent study routines, insufficient support for diverse learning styles, and the absence of social interaction spaces. By integrating a rich array of interactive features, adaptive learning technologies, and user-centric tools, "My Little Learner: E-Learning Wonderland" successfully delivers a transformative educational experience that bridges the gap between traditional classroom learning and modern digital solutions.

At its core, the application provides a vibrant, child-friendly interface that captivates young learners through gamified elements like animated lessons, interactive quizzes, storytelling, music-based activities, and a reward system featuring virtual stickers and badges. These features, such as the train-themed Math Lesson Page and airplane-themed English Lesson Page, foster curiosity and maintain engagement by aligning with the developmental and cognitive abilities of kindergarteners. The incorporation of adaptive learning algorithms ensures that content is personalized to each child’s learning pace and style, enhancing comprehension and retention. Rigorous system testing, including end-to-end functional tests and usability evaluations with kindergarten-aged children, confirmed the app’s seamless functionality and intuitive design. All test scenarios, from user authentication to quiz participation and progress tracking, passed without issues, while usability tests validated that young users could navigate the app independently, interacting effortlessly with buttons, icons, and animations.

Beyond that, the app offers a comprehensive dashboard that provides real-time insights into a child's learning journey, highlighting strengths, areas for improvement, and progress metrics like lesson completion rates and quiz scores. The calendar-based notification system further supports consistent learning by delivering timely, customizable reminders for lessons and activities, addressing the challenge of irregular study patterns. The app's support for diverse learning styles, through audiovisual content, hands-on activities, and text-to-speech functionality, ensures inclusivity, catering to visual, auditory, and kinesthetics learners. Additionally, the integration of collaborative discussion rooms, such as the space-themed Math Discussion Room and rocket-themed English Discussion Room, replicates the social dynamics of physical classrooms, enabling peer-to-peer interaction through text, voice, and image sharing. These features, validated through stakeholder feedback and testing, create a holistic learning environment that promotes both academic and social development.

The project's adherence to the Agile methodology facilitated iterative development, allowing continuous refinement based on feedback from educators, parents, and children. This approach ensured that the app evolved to meet user needs effectively, with two major iterations culminating in a robust final product. While the app has not yet been publicly deployed, its internal release to stakeholders demonstrated high quality, performance, and alignment with educational objectives. The project also acknowledges the full software lifecycle, with planned maintenance activities to address post-deployment updates and bug fixes, and a retirement phase to manage future transitions to newer technologies or versions, ensuring long-term sustainability.

In conclusion, "My Little Learner: E-Learning Wonderland" sets a new benchmark for kindergarten e-learning by delivering a platform that is both technologically advanced and pedagogically sound. It successfully fulfils its objectives of creating an engaging, personalized, and inclusive learning environment that empowers young learners, supports parental involvement, and fosters collaboration. By addressing critical gaps in early childhood education, this project not only enhances the learning experience for kindergarteners but also paves the way for future innovations in educational technology. As a testament to its potential, the app promises to prepare young learners for a digital future, instilling a love for learning and laying a strong foundation for their academic and personal growth.

8.2 Recommendation

To enhance the functionality, accessibility, and long-term impact of My Little Learner: E-Learning Wonderland, several realistic and focused recommendations are proposed. These suggestions aim to refine the app, broaden its reach, and ensure alignment with practical educational needs.

First, **adding support for additional languages** such as Malay, Mandarin, and Tamil, alongside English, will make the app more inclusive for Malaysia's diverse population. Incorporating text-to-speech features and voice-overs in these languages can further improve accessibility, enabling non-English-speaking kindergarteners to engage fully with the content. This multilingual approach ensures that language barriers do not hinder learning and promotes a more equitable educational experience.

In addition, **broader user testing** is recommended before public release. Conducting larger-scale testing with diverse groups of children, parents, and educators, including participants from varied socioeconomic and cultural backgrounds, will ensure the app's interface, content, and features are intuitive and inclusive. Insights gathered from this feedback will guide refinements to usability and help address any overlooked needs, ensuring the app serves a wide range of users effectively.

Finally, to ensure the app's sustainability and relevance, its backend infrastructure should be optimized for scalability to handle increased user demand post-launch. Establishing a **schedule for regular content updates**, incorporating emerging educational trends such as STEM activities, will keep the app engaging and up to date. Forming a small content review team comprising educators can ensure that all new materials align with kindergarten curricula and educational standards.

These targeted recommendations focus on practical improvements that will enhance accessibility, inclusivity, and usability, positioning My Little Learner: E-Learning Wonderland as a sustainable and impactful tool for early childhood education.

8.3 Future Phases: Maintenance and Retirement

While the primary focus of this Final Year Project (FYP2) was on the development and initial release of the Kindergarten E-learning app, it is important to acknowledge the full software lifecycle, which extends beyond the current scope of this project. The future phases of maintenance and retirement are essential to the app's long-term success and sustainability. These phases outline the processes that will be needed after the app is publicly launched and how it will be maintained and eventually phased out when no longer relevant or necessary.

8.3.1 Maintenance

This phase outlines the planned maintenance activities for potential future implementation. Although the maintenance phase was not executed during this Final Year Project (FYP2), it is included to demonstrate awareness of the complete software development lifecycle.

Once the app is fully developed and publicly released (e.g., on platforms like the Google Play Store or Apple App Store), maintenance will ensure the app remains functional, reliable, and relevant. This involves post-deployment activities such as bug fixes, updates, and feature enhancements. While deployment is outside the scope of this project, planning for long-term support is essential to ensure the app’s sustainability after release.

8.3.2 Retirement

The Retirement phase is anticipated for consideration in the future, beyond the scope of this Final Year Project (FYP2). This phase will involve planning for the eventual phasing out or replacement of the Kindergarten E-learning application as technologies evolve, educational practices advance, or newer versions of the app are developed.

Possible activities during this phase may include transitioning users to an updated version of the software, adopting newer educational content and technological improvements, or discontinuing the app if it is no longer relevant or effective. To ensure a smooth transition, clear communication, timely notifications, and user support will be provided to guide educators, parents, and students through any changes. Proper data migration, user training (if applicable), and assistance will also be considered to minimise disruption and maintain user confidence.

Although this phase is not implemented within the current project timeframe, it is acknowledged as an essential part of the application's long-term lifecycle management.

REFERENCES

[1] S. Kumar, "5 Common Problems Faced By Students In eLearning And How To Overcome Them," *eLearning Industry*, Jul. 10, 2015. https://elearningindustry.com/5-common-problems-faced-by-students-in-elearning-overcome

[2] "5 problems e-learning students experience," *Edology*. https://www.edology.com/blog/study-and-careers-advice/problems-with-e-learning/

[3] S. Shahpo, N. Alfadil, N. Almadani, H. Abualsoud, M. Alshehri, and A. Asrar, "Evaluation of The Quality of E-Learning Platforms Used in Educating Kindergarten Children Distantly During the Coronavirus Pandemic," *Journal of Statistics Applications & Probability*, vol. 13, no. 1, pp. 559–570, Jan. 2024, doi: https://doi.org/10.18576/jsap/130139.

[4] F. Niklas, E. Annac, and A. Wirth, "App-based learning for kindergarten children at home (Learning4Kids): study protocol for cohort 1 and the kindergarten assessments," *BMC Pediatrics*, vol. 20, no. 1, Dec. 2020, doi: https://doi.org/10.1186/s12887-020-02432-y.

[5] K. Parish, "How To Boost eLearning Engagement With Push Notifications," *eLearning Industry*, Apr. 13, 2023. https://elearningindustry.com/how-to-boost-elearning-engagement-with-push-notifications

[6] "Types of User-Oriented Push Notifications for ELearning Software," *Incora - European software development company*. https://incora.software/insights/types-of-push-notifications-for-elearning

[7] Lucafriends, "Create best E-learning Environment For Your Kids' Early-Childhood Education," *Lucafriends*. https://www.lucafriends.com/blogs/tips-for-parents/create-best-e-learning-environment-for-your-kids-early-childhood-education

[8] "Start Learning: Create an Educational App for Your Business | Shakuro," *shakuro.com*. https://shakuro.com/blog/how-to-create-an-educational-app-a-complete-guide-and-cost-breakdown?utm_source=linkedin&utm_medium=how-to-create-an-educational-app-a-complete-guide-and-cost-breakdown&utm_campaign=blog_sharing

[9] D. P. Tuliao, T. J. Duldulao, W. C. Pagtaconan, and A. A. Galang, "Development of a Mobile Learning Application for Kindergarten: Process, Issues, and Challenges," *International Journal on Open and Distance e-Learning*, vol. 1, no. 1 & 2, Dec. 2015, Available: https://ijodel.upou.edu.ph/index.php/ijodel/article/view/7

[10] L. Hansen, O. Hansen, and P. Andersen, "E-Learning and Comprehensive School and Kindergarten Development," *International Journal of Advanced Corporate Learning (iJAC)*, vol. 5, no. 3, pp. 12–17, Aug. 2012, Accessed: Dec. 06, 2023. [Online]. Available: https://www.learntechlib.org/p/45657/

[11] Khan Academy Kids, "Free, Fun Educational App for Young Kids | Khan Academy Kids," *learn.khanacademy.org*, 2022. https://learn.khanacademy.org/khan-academy-kids/

[12] SplashLearn, "SplashLearn - Fun Math Practice Games for Kindergarten to Grade 5," *Splashlearn.com*, 2020. https://www.splashlearn.com/

[13] "Originator» Endless Reader," *Originatorkids.com*, 2013. https://www.originatorkids.com/endless-reader-2/

[14] "The Best Learning App for Kids | Children and Kindergarten App," *Praadis Education*. https://praadisedu.com/kids-learning-app/us

[15] M. Xia *et al.*, "Visual Analytics of Student Learning Behaviors on K-12 Mathematics E-learning Platforms," *arXiv.org*, 2019. https://arxiv.org/abs/1909.04749 (accessed May 05, 2025).

[16] A. Singh, "E-Learning and its Socioeconomics." Accessed: Dec. 07, 2023. [Online]. Available: https://arxiv.org/ftp/arxiv/papers/2107/2107.05041.pdf

[17] J. Zhang and B. Liao, "Learning on The Fingertips: The Opportunities and Challenges of Educational Apps," 2015. Available: https://files.eric.ed.gov/fulltext/EJ1079047.pdf

[18] L. Donath, G. Mircea, and T. Rozman, "E-Learning Platforms as Leverage for Education for Sustainable Development," *European Journal of Sustainable Development*, vol. 9, no. 2, pp. 1–19, Jun. 2020, doi: https://doi.org/10.14207/ejsd.2020.v9n2p1.

[19] V. Maphosa and B. Dube, “Local Language Numeracy Kindergarten Prototype Design to Support Home-based Learning During and Post COVID-19 Pandemic,” *Contemporary Educational Technology*, vol. 13, no. 3, p. ep301, Apr. 2021, doi: https://doi.org/10.30935/cedtech/10846.

[20] A. Chatzopoulos *et al.*, “Evaluation of Google Play educational apps for early childhood education,” vol. 3, no. 2, pp. 770–778, Jul. 2023, doi: https://doi.org/10.25082/amler.2023.02.004.

[21] S. Alneyadi, Y. Wardat, Q. Alshannag, and A. Abu-Al-Aish, “The effect of using smart e-learning app on the academic achievement of eighth-grade students,” *Eurasia Journal of Mathematics, Science and Technology Education*, vol. 19, no. 4, p. em2248, Apr. 2023, doi: https://doi.org/10.29333/ejmste/13067.

[22] A. Zhezherau, “The Agile Software Development Life Cycle | Wrike Agile Guide,” *Wrike*. https://www.wrike.com/agile-guide/agile-development-life-cycle/#the-six-phases-of-the-agile-life-cycle

[23] A. Waseem , “Agile Project Management: A Comprehensive Guide,” *management.org*, Mar. 02, 2022. https://management.org/agile-project-management

APPENDIX

QUESTIONNAIRE SURVEY

1. Age of the Child?
   A) 3-4 years old
   B) 4-5 years old
   C) 5-6 years old

2. Does your child have prior experience with e-learning platforms?
   A) Yes
   B) No

3. How often does your child use an electronic device for learning?
   A) Daily
   B) A few times a week
   C) Rarely
   D) Never

4. What kind of devices does your child use for e-learning? (Select all that apply.)
   A) Tablet
   B) Smartphone
   C) Laptop/Computer
   D) None

5. How easy is it for your child to navigate e-learning platforms?
   A) Very Easy
   B) Easy
   C) Neutral
   D) Difficult
   E) Very Difficult

6. Which subjects are most important for your child's learning?
   A) Math
   B) English
   C) Science

D) Art and Creativity

E) Social Skills and Emotional Learning

7. What type of activities does your child enjoy the most? (Select all that apply.)
   A) Watching educational videos
   B) Listening to stories or music
   C) Playing educational games
   D) Solving puzzles or quizzes
   E) Drawing or colouring

8. How important is it for your child to interact with other children while learning?
   A) Not Important at All
   B) Not Important
   C) Neutral
   D) Important
   E) Very Important

9. Do you think the reminder notification system for maintaining your child's learning schedule is important?
   A) Not Helpful at All
   B) Not Helpful
   C) Neutral
   D) Helpful
   E) Very Helpful

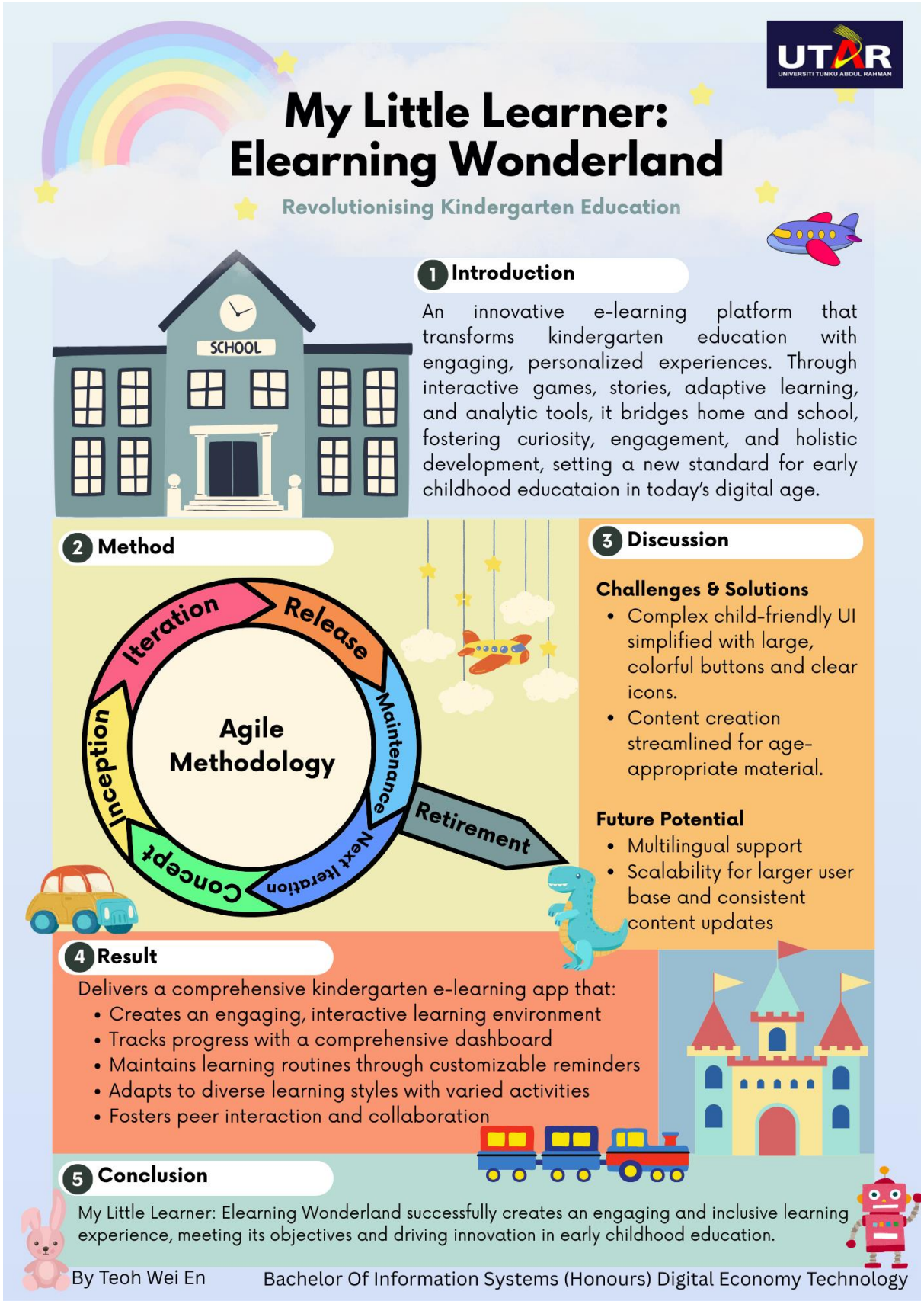
10. How important is it to monitor your child's progress in the e-learning platform?
    A) Not Important at All
    B) Not Important
    C) Neutral
    D) Important
    E) Very Important

11. Which tools would help you the most to support your child's learning?
    A) Detailed progress reports
    B) Detailed progress data analytics dashboard

C) Notifications about your child's activities

D) Access to additional resources or tips for parents

POSTER


My Little Learner: Elearning Wonderland
Revolutionising Kindergarten Education
1 Introduction
An innovative e-learning platform that transforms kindergarten education with engaging, personalized experiences. Through interactive games, stories, adaptive learning, and analytic tools, it bridges home and school, fostering curiosity, engagement, and holistic development, setting a new standard for early childhood educataion in today's digital age.
SCHOOL
2 Method
Agile Methodology
Inception
Concept
Iteration
Release
Maintenance
Next Iteration
Retirement
3 Discussion
Challenges & Solutions
• Complex child-friendly UI simplified with large, colorful buttons and clear icons.
• Content creation streamlined for age-appropriate material.
Future Potential
• Multilingual support
• Scalability for larger user base and consistent content updates
4 Result
Delivers a comprehensive kindergarten e-learning app that:
• Creates an engaging, interactive learning environment
• Tracks progress with a comprehensive dashboard
• Maintains learning routines through customizable reminders
• Adapts to diverse learning styles with varied activities
• Fosters peer interaction and collaboration
5 Conclusion
My Little Learner: Elearning Wonderland successfully creates an engaging and inclusive learning experience, meeting its objectives and driving innovation in early childhood education.
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