UNIVERSITI TEKNIKAL MALAYSIA MELAKA

Faculty of Electronics and Computer Technology Engineering

PLAY AND LEARN MOBILE APPLICATION

YALAN A/L SIVALINGGAM

Bachelor of Computer Engineering Technology (Computer Systems) with Honours

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PLAY AND LEARN MOBILE APPLICATION

YALAN A/L SIVALINGGAM

A project report submitted
in partial fulfillment of the requirements for the degree of
Bachelor of Computer Engineering Technology (Computer Systems) with Honours

Faculty of Electronics and Computer Technology and Engineering

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FAKULTI TEKNOLOGI KEJUTERAAN ELEKTRIK DAN ELEKTRONIK

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DEDICATION

To my beloved mother, Thanetha laane, and father, Sivalinggam,
And to my family.

ABSTRACT

The global expansion of information technology, especially in the mobile sector, has led to an increase in smartphone usage not only among adults but also among children. The rising trend of mobile applications has prompted developers to create educational apps that make learning alphabets, numbers, shapes, and quizzes enjoyable for kids. This research focuses on the development of an Android-based educational app called "PLAY AND LEARN." Its objective is to help children familiarize themselves with numbers, recognize letters and shapes, and engage in interactive quizzes through an appealing user interface. The development process involved data collection, design, and implementation, utilizing research literature, comparing with similar apps, conducting interviews, and administering questionnaires. The app's design was structured using a storyboard, and its implementation followed the waterfall model. The outcome is an educational application, "PLAY AND LEARN," which serves as a learning tool and electronic media for children, promoting interest and enjoyment in the learning process. The app's uniqueness lies in its ability to enhance early letter and number recognition, expand shape knowledge, introduce proper pronunciation, develop quiz-solving skills, and foster electronic media-based learning.

ABSTRAK

Pembangunan teknologi maklumat semakin pesat di seluruh dunia, terutamanya teknologi mudah alih. Pada hari ini, teknologi mudah alih tidak hanya digunakan oleh orang dewasa tetapi juga kanak-kanak. Proporsi kanak-kanak yang menggunakan telefon pintar semakin meningkat setiap tahun. Pertumbuhan teknologi dalam aplikasi mudah alih mendorong para pembangun untuk membina aplikasi pendidikan untuk membantu kanak-kanak belajar mengenali abjad, nombor, bentuk, dan kuiz mudah dengan cara yang menyeronokkan. Kertas ini menghuraikan aplikasi pendidikan "PLAY AND LEARN" sebagai aplikasi berdasarkan Android. Tujuan "PLAY AND LEARN" ini adalah untuk membantu kanak-kanak mengenali nombor, mengenali huruf, mengenali bentuk, dan menjalankan kuiz mudah dengan antara muka yang menarik. Kaedah penyelidikan termasuk pengumpulan data, reka bentuk, dan pelaksanaan. Pembangunan dilakukan melalui literatur penyelidikan, perbandingannya dengan aplikasi serupa, temubual, dan soal selidik. Reka bentuk aplikasi menggunakan storyboard. Pelaksanaannya merujuk kepada model waterfall. Hasilnya adalah aplikasi pendidikan "PLAY AND LEARN" yang boleh menjadi alat pembelajaran dan media elektronik untuk pembelajaran dengan konsep yang menarik dan menyeronokkan. Sumbangan dan keunikan termasuk peningkatan kemampuan kanak-kanak untuk mengenali huruf dan nombor pada peringkat awal, peningkatan pengetahuan tentang bentuk, memperkenalkan cara melafalkan huruf dan nombor kepada kanak-kanak, serta melatih kemampuan kanak-kanak dalam menjawab kuiz mudah dan memperkenalkan kaedah pembelajaran dengan media elektronik.

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TABLE OF CONTENTS

v

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

CHAPTER 1

INTRODUCTION

1.1   Background

In today's rapidly evolving world of information technology, there is an increasing demand for technology and knowledge among communities. The availability of knowledge has become easily accessible from various sources, and people now have the ability to consume information effortlessly through the use of technology. The advancement of multimedia technology has significantly transformed the way we live, and smartphones, particularly those powered by the Android operating system, have gained immense popularity.

Android, being an open-source platform, has fostered the development of a vast array of software applications. Since its release in 2008, Android has continued to expand, providing developers with a wealth of tools and opportunities for application development. The availability of Android smartphones for both commercial and non-commercial purposes has further fueled their adoption.However, when it comes to learning resources specifically designed for kids using Android software, the options are limited. Existing apps usually focus on providing single educational resources, such as apps for learning letters or numbers. Recognizing this gap, there is a need to consolidate and utilize educational resources in a way that offers a comprehensive teaching tool for kids, covering letters, numbers, shapes, and basic quiz questions.The "PLAY AND LEARN" application was created to address this need and assist children in recognizing letters, numbers, and shapes in an engaging and enjoyable manner. It is well-known that children learn through their senses, with hearing and sight being the primary senses that contribute to their learning process. E-learning, with its

11

multimedia features, benefits children by enhancing their motor skills, refining hand-eye coordination, and honing problem-solving abilities.. By leveraging music, animation, and dynamic visuals, the "PLAY AND LEARN" app aims to provide a stimulating learning experience for children. The objective of the "PLAY AND LEARN" app is to help children learn numbers, the alphabet, and shapes, while also offering interactive quizzes to reinforce their learning. The application's advantages include helping young children recognize letters and numbers at an early stage, expanding their knowledge of shapes, teaching them how to spell letters and numbers, training them to participate in simple quizzes, and introducing them to the concept of learning through electronic media.By combining educational content with entertaining features, the "PLAY AND LEARN" app strives to make learning a fun and interactive experience for kids. It aims to enhance their cognitive development and foster a strong foundation for future learning. With the convenience and accessibility of mobile technology, this application empowers children to explore and engage with educational content in a meaningful way.

1.2 Global Issues in kid's Mobile E-Learning Applications

The digital divide is one of the major problems involving mobile e-learning programmes for children. Despite the fact that mobile devices are more widely available, there are still large gaps in access to technology, especially in low-income and marginalised areas. Because of the digital divide, some kids have easy access to educational apps while others don't have the resources they need to learn.The effectiveness and usability of mobile e-learning programmes is another issue. Finding trustworthy and high-quality solutions can be challenging for parents and educators because there are so many educational applications accessible. Children's learning outcomes may be hampered by the fact that not all apps are created with pedagogical knowledge or in accordance with educational standards.Mobile e-

learning apps also raise privacy and security issues. These apps may gather personal data about children, including names, ages, and even location information. To secure children's data and adhere to data protection laws, it is imperative to make sure that the proper privacy measures are in place.Additionally, applications for mobile e-learning must be inclusive and sensitive to cultural differences. Since children come from a wide range of backgrounds, educational apps should reflect a wide range of cultures, languages, and experiences. Certain groups of kids may be excluded or have restricted engagement if this isn't done.The discussion surrounding screen time and digital addiction is also pertinent in the context of mobile e-learning applications, to sum up. Even while these applications offer useful educational content, too much screen time can be harmful to kids' physical and emotional health. Striking a balance between using mobile e-learning apps as teaching resources and making sure kids have a well-rounded childhood that includes physical activities and face-to-face contacts is crucial for parents and educators.Collaboration between legislators, educators, app developers, and parents is necessary to address these worldwide concerns. To maximise the advantages of mobile e-learning applications for children's education, efforts should be made to close the digital divide, encourage the creation of high-quality educational apps, put children's privacy and safety first, advance cultural inclusivity, and promote responsible and balanced use of these tools.

1.3   Problem Statement

Problem statement are listed why there must develop PLAY AND LEARN mobile application. This does additionally indicate that the current development style is less proficient. Issue that appears in the old development style are lack of animation and lack of music or sounds. Next is the old development style kids tend to read too much in a short period of time. Finally, lack of fun way in quizzes. From developing PLAY AND LEARN

13

mobile application can produce good animation and visual quality and also provide suitable music and sounds in PLAY AND LEARN mobile application. After that, to solve the reading too much of text PLAY AND LEARN mobile application will use more picture or vectors instead of words. At last, to make the quizzes fun PLAY AND LEARN mobile application will use pictures and voice overs.In addition to the problem statements mentioned earlier, there are several other issues that arise from the old development style, which further emphasize the need for the development of the "PLAY AND LEARN" mobile application. One of the key issues is the lack of interactivity and engagement due to the absence of animations and sounds in the existing learning resources. Traditional methods of teaching and learning often rely on static text-based materials, which may not effectively capture the attention and interest of young children. By incorporating high-quality animations and suitable music or sounds, the "PLAY AND LEARN" mobile application aims to establish a lively and absorbing learning atmosphere that activates children's senses and amplifies their involvement.

Another problem with the old development style is that children tend to read too much text in a short period of time. This can be overwhelming and may hinder their ability to grasp and retain the information effectively. To address this issue, the "PLAY AND LEARN" mobile application will utilize more visual elements such as pictures or vectors instead of relying solely on textual content. By presenting information in a visual format, children can better understand and absorb the concepts, making the learning process more enjoyable and effective.Furthermore, the existing learning resources often lack a fun and interactive approach to quizzes. Traditional quizzes may rely solely on text-based questions, which can be monotonous and less engaging for children. In contrast, the "PLAY AND LEARN" mobile application will introduce quizzes that incorporate pictures and voice-overs, making the learning experience more interactive and enjoyable. This approach encourages active

14

participation and enables children to connect with the content in a playful manner, promoting better comprehension and retention of knowledge.By addressing these additional problem statements, the "PLAY AND LEARN" mobile application aims to overcome the limitations of the old development style and provide a more efficient and effective learning experience for children. Through the integration of animations, visual elements, suitable music, and interactive quizzes, the application seeks to create an engaging and enjoyable platform that fosters children's cognitive development and facilitates their acquisition of knowledge

1.4   Project Objective

There were various objectives that needed to be met in order to establish the project's success. The primary objective of this project is to create an e learning mobile application. The objectives are as stated below:

a)   To develop a mobile application-based prototype of PLAY AND LEARN mobile application.

b)   Kids can learn about the basic functions, features, and components of these devices through engaging visuals and simplified explanations with fun and entertain

c)   Decrease the burden of the teachers in kindergarten.

1.5   Scope of Project

Educational Content: The application should offer a wide range of educational content tailored to the developmental stage of children aged 3-6. This can include subjects like math, language development, art, and problem-solving. The content should be age-

appropriate, engaging, and presented in a visually appealing manner to capture children's attention and maintain their interest.

Fun and Captivating Design: The application's design should be colorful, visually appealing, and feature child-friendly graphics and animations. The use of vibrant colors, cute characters, and interactive elements can enhance engagement and make the learning experience enjoyable for children. Intuitive navigation and user-friendly interfaces are also important to ensure ease of use for young learners.

Interactive Learning Activities: The application should provide interactive learning activities that allow children to actively participate and engage with the content. These activities can include puzzles, quizzes, interactive games, and hands-on experiments. Interactive elements like drag-and-drop, touch, and voice interactions can make the learning experience more immersive and enjoyable.
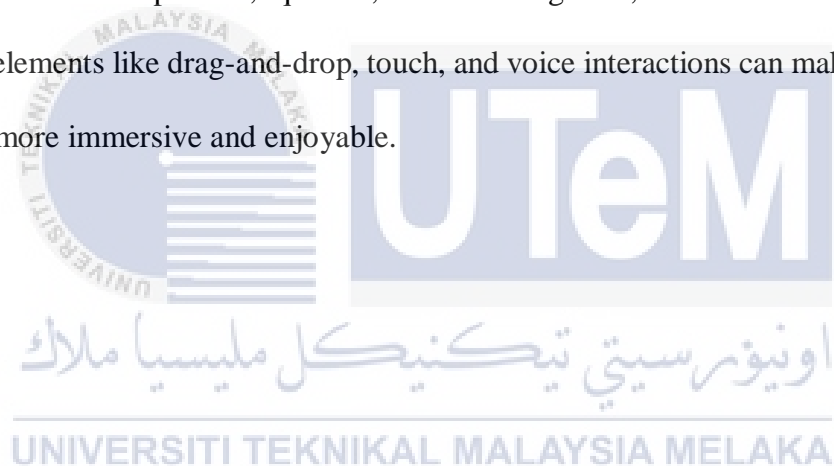
CHAPTER 2

LITERATURE REVIEW

2.1   Introduction

The way we access information and interact with educational content has changed dramatically as a result of the quick improvements in technology and the widespread usage of smartphones and tablets. As a result, the e-learning industry has experienced rapid expansion, opening up fresh ways to disseminate educational content and promote learning outside of the traditional classroom. In this overview of the literature, we explore the scholarly publications and current research on children-focused mobile learning applications. With a focus on mobile platforms, the goal of this literature study is to get a thorough grasp of the state of children's e-learning applications today. We want to identify major trends, efficient instructional strategies, and best practices in the design and implementation of e-learning mobile applications for young learners by reviewing the existing literature. The difficulties and restrictions that e-learning programs for kids must deal with will also be covered in this literature review, including the effects of screen time on young learners and the importance of parental monitoring. Understanding these issues will help us address them in our application and give kids a secure and stimulating learning environment. Our aim is to contribute to the existing knowledge on mobile e-learning applications for children by consolidating findings from the available literature.The knowledge gathered from this evaluation will direct the creation of our application, ensuring that it is in line with the most recent findings and industry standards. In conclusion, the knowledge and research findings from this evaluation of the literature will serve as a basis for the stages of our project that will come after. We can design and develop an e-learning

17

mobile application that effectively engages and educates kids, supporting their enthusiasm for learning while guaranteeing a safe and enriching digital experience, by evaluating the existing landscape and discovering holes in the literature. In addition to the topics already mentioned, this literature review will delve into several key aspects related to children-focused mobile learning applications. These include the impact of gamification and interactive features on learning outcomes, the role of personalized learning experiences, the integration of multimedia elements to enhance engagement, and the potential benefits of social interaction within these applications. By examining these areas, we aim to gain insights into effective instructional strategies and best practices that can be incorporated into our application design. Moreover, the review will also address the challenges and limitations that e-learning programs for children face. This includes exploring the potential negative effects of excessive screen time on young learners, discussing strategies to mitigate these risks, and examining the importance of parental monitoring and involvement in children's e-learning experiences. By understanding these difficulties and restrictions, we can develop appropriate measures to ensure the well-being and safety of children while using our application. By conducting a comprehensive evaluation of the existing literature, this review aims to contribute to the field of mobile e-learning applications for children. It seeks to fill any gaps in current knowledge and identify areas where further research is needed. The results obtained from this review will form the basis for the following phases of our project, directing the creation and implementation of an e-learning mobile application that successfully captivates and instructs young learners, all within a safe and enriching digital setting.Overall, this literature review endeavors to provide a thorough understanding of the state of children's e-learning applications today, highlighting major trends, efficient instructional strategies, best practices, and the challenges associated with this domain. By synthesizing and analyzing the existing knowledge, we aim to create an application that

aligns with the latest research findings and industry standards, contributing to the body of knowledge in the field of mobile e-learning for children.

2.2 E-Learning

E-learning, often known as electronic learning, is a contemporary method of teaching that makes use of electronic technologies to give lessons and courses. It involves accessing educational content online and using digital devices like computers, smartphones, and tablets. E-learning offers easy and adaptable learning alternatives that let students learn at their own speed from any location with an internet connection. To increase engagement and encourage active learning, it includes interactive components including films, tests, and simulations. E-learning is utilized in a range of educational contexts, including corporate training initiatives as well as schools and universities. By enabling personalized learning paths, increasing educational access, and offering a variety of materials and tools to facilitate learning, it has completely changed the way that people learn. The collected empirical data from this study will markedly augment the current knowledge in the realms of technology and academia, offering valuable perspectives on forecasting adoption rates.Additionally, the data collected will make substantial contributions to the realms of technology and academia by shedding light on the acceptance and adoption of E-learning mobile applications. This research will enhance our understanding of the factors influencing user behavior and preferences, ultimately informing the development and implementation of future educational technologies.[12] In addition to the benefits mentioned, e-learning has gained significant attention in recent years due to its potential to revolutionize education for children. The widespread usage of smartphones and tablets, coupled with advancements in technology, has paved the way for mobile learning applications specifically designed for young learners. These applications offer a unique opportunity to engage children in interactive and

19

immersive learning experiences, enabling them to explore various subjects, develop critical thinking skills, and enhance their knowledge in a fun and engaging manner.

One key aspect of e-learning applications for children is the incorporation of gamification elements. By integrating game-like features such as rewards, badges, and leaderboards, these applications can motivate and incentivize children to actively participate in the learning process. Gamification has shown promise in increasing engagement, promoting knowledge retention, and fostering a positive attitude towards learning among young learners. Game based learning creates a more conducive environment for learning, and young students are more eager to use games that provide them with knowledge and a more aesthetically pleasing environment. As a result, they enjoy taking these tests in educational institutions. Additionally, they offer games where children may identify objects and interact with user interfaces. These game-based learning aids are more appealing to children, and they desire to learn these things pleasantly. [28]

Another important consideration in designing e-learning applications for children is personalization. These applications can adapt to individual learning needs and preferences, offering tailored content and activities based on each child's strengths and areas for improvement. Personalized learning experiences have been shown to enhance student motivation, self-efficacy, and overall learning outcomes.

Furthermore, the integration of multimedia elements, such as videos, images, and interactive simulations, can significantly enhance the learning experience for children. Visual and interactive content can help in conveying complex concepts, stimulating curiosity, and facilitating better comprehension and retention of information.

However, it is essential to acknowledge the challenges and limitations associated with e-learning applications for children. Excessive screen time can have negative effects on children's health and well-being, including potential impacts on their cognitive development

20

and social interactions. Therefore, it is crucial to strike a balance between digital learning and other offline activities, and for parents to actively monitor and regulate children's screen time.

Additionally, research has demonstrated the effectiveness of e-learning applications delivered through mobile devices in improving knowledge and skills among healthcare professionals. For example, a study conducted in Australia found that training delivered through an online learning module via mobile phones enhanced nurses' knowledge of atrial fibrillation and anticoagulation. Similarly, a study conducted in Rwanda showed that training using a mobile learning application improved the knowledge of nurses and midwives in the areas of postpartum hemorrhage management and neonatal resuscitation (Nishimwe, 2019). These findings highlight the potential of mobile-based e-learning applications to enhance professional development and education in various healthcare contexts.[23]

In conclusion, the field of e-learning applications for children offers immense potential to transform education by providing engaging, personalized, and interactive learning experiences. By harnessing the power of technology and incorporating effective instructional strategies, these applications can create a safe and stimulating learning environment for young learners. The empirical data generated from this study will contribute to the body of knowledge in the fields of technology and academia by predicting the acceptance and adoption of e-learning mobile applications, thereby informing future research and development in this area.

2.2.1 Android

Google created the open-source Android operating system, which is mostly utilized in mobile devices like smartphones and tablets. It is one of the most widely used operating systems in the world because it offers a platform for developers to produce and distribute a

wide variety of apps. Android provides a user-friendly interface that makes it simple for users to navigate between apps and settings. It supports a sizable ecosystem of apps that can be downloaded from the Google Play Store and provide functionality in many different areas, such as communication, entertainment, productivity, and education. Google services like Gmail, Google Maps, and Google Drive are also seamlessly integrated with Android. Android users may add widgets, wallpapers, and themes to their smartphones to make them more uniquely their own. Multitasking is also supported by Android. The Android operating system is an operating system on smartphones that are freely available for commercial or noncommercial Use.[2] The Android operating system includes a number of other features and advantages that contribute to its success in addition to its broad use and user-friendly interface. The open-source nature of Android is one of its main benefits. Because it is an open-source platform, developers can freely access the operating system's source code and change and adapt it to suit their unique needs. This openness encourages creativity and the creation of a wide variety of applications, creating a vibrant ecosystem of Android apps. Users get access to millions of apps in a variety of categories through the Google Play Store, the official app store for Android. Users can find applications that are tailored to their individual interests in this vast app collection, whether they are entertainment, productivity, or educational apps for kids. The variety and functionality of Android smartphones are improved by the availability of such a large number of apps.

Android smartphones also smoothly interface with a number of Google services. With the help of this connection, users can quickly access and use well-known Google services like Gmail, Google Maps, Drive, and Calendar, among others. Users may manage their personal and professional responsibilities in a cohesive environment because to the smooth integration of various services, which improves the user experience.Android offers customization options as well, enabling users to customize their devices to their tastes. Users

22

can add widgets on their home screens, change the background, use multiple themes, and personalize their notification settings. Users can design a gadget that matches their individual taste and improves their overall user experience thanks to this level of personalization. Android also offers multitasking, which enables users to easily switch between various apps. Users can use their smartphones more productively and efficiently by running many applications at once.

In conclusion, factors that contribute to the broad use and popularity of the Android operating system include its open-source nature, huge app ecosystem, easy integration with Google services, customization choices, and support for multitasking. With the help of these capabilities, Android devices are more adaptable, user-friendly, and able to satisfy a variety of user needs and preferences.

2.2.2   Mobile Application

A mobile app, specifically designed for operation on smartphones and tablets, is a software application offering a range of functionalities to cater to users' needs and interests. These apps can be developed as cross-platform programs compatible with various operating systems or designed for specific platforms like Android or iOS. Providing users with convenience and accessibility, mobile applications cover areas such as social networking, entertainment, productivity tools, e-commerce, health and fitness tracking, and more. Leveraging features like GPS, cameras, accelerometers, and touch screens on mobile devices, these apps enhance user experiences. Typically downloaded from app stores like the Apple App Store or Google Play Store, mobile apps have significantly transformed our daily lives, influencing how we communicate, work, learn, and spend leisure time. However, challenges persist, particularly in the design of information capturing processes in mobile learning, often due to ineffective implementations of learning activities in traditional

classrooms, leading to negative perceptions of instructional technology by students. [11] Mobile applications are successfully used as part of innovative educational technologies to enhance learning in various disciplines and the demand for competent mobile application developers globally is high [14] Our daily lives have become completely reshaped by mobile applications, which have changed how we communicate, learn, and engage with the world. These programs provide a broad range of functionalities to meet a variety of demands and interests.

The accessibility and convenience of mobile applications are two of its main benefits. The widespread usage of smartphones and tablets has made it possible for consumers to access services, information, and entertainment while on the go. Mobile applications give customers the convenience of accessing these features anytime, anywhere, whether it be for social networking, streaming media, task management, increasing productivity, online shopping, or keeping track of health and fitness.Mobile applications take advantage of their users' devices' capabilities to improve their user experiences. For the purpose of creating interactive and immersive experiences, features like GPS, cameras, accelerometers, and touch screens are used. For instance, camera integration enables augmented reality experiences or document scanning, while location-based apps can offer users personalized information based on their location. Apps become more interactive and user-friendly thanks to the touch screen interface's intuitive and haptic interactions.

Typically, app marketplaces like the Apple App Store or Google Play Store are used to download and set up mobile apps. These systems offer a centralized app store where users can quickly find, download, and update software. By enforcing rules and conducting evaluations before to an app's release to the public, app stores also play a critical role in assuring app security and quality.Mobile apps have created new learning and skill-building opportunities in the realm of education. They are used as a component of cutting-edge

24

educational technologies to improve learning across a range of disciplines. With the help of these applications, students can interact dynamically and engagingly with instructional information through interactive lectures, tests, simulations, and personalized learning routes. As organizations work to maximize the potential of mobile learning to enhance educational results, there is a great need for skilled mobile application developers in the education sector and beyond. To sum up, mobile applications have completely changed how we communicate, work, learn, and pass the time. They have become a vital part of our lives thanks to their accessibility, convenience, and variety of functions. Mobile applications, which provide consumers unique and interesting experiences, will continue to play a significant role in determining the future of numerous industries, including education.

Adobe Animate Development Tools

Adobe Animate is a versatile multimedia authoring and animation software developed by Adobe Systems. It is a go-to tool for creating engaging 2D animations, interactive content, and multimedia applications. With its focus on vector graphics, Animate ensures that artwork retains quality even when scaled, making it ideal for a wide range of design projects. The software provides a user-friendly timeline interface with keyframes for crafting complex animation sequences, allowing precise control over timing and easing. Export options are diverse, with the ability to save animations in formats like HTML5, video, and animated GIFs, making it suitable for web and multimedia production. Animate is particularly well-suited for creating interactive web content using HTML5 and WebGL technology, including web banners, games, and interactive infographics. Integration with other Adobe Creative Cloud apps streamlines the workflow, while cross-platform compatibility ensures content works seamlessly on various devices. It also supports responsive design for adapting content to different screen sizes and orientations. Advanced features include puppet animation tools

and scripting capabilities like ActionScript for custom interactivity. Adobe Animate is widely employed by animators, web developers, and multimedia creators for diverse projects, such as interactive web content, advertisements, educational materials, games, and multimedia presentations.

Figure 2.1 Adobe Animate

Adobe Photoshop Development Tools

Adobe Photoshop stands as a robust and widely used graphic design and photo editing software, favored for its extensive array of features and tools that empower users to edit, enhance, and craft digital images. Embraced by photographers, graphic designers, and artists across diverse fields, Photoshop's versatility and comprehensive toolset cater to both professionals and enthusiasts. Renowned for its non-destructive editing capabilities, Photoshop allows precise alterations, from basic adjustments like cropping and color correction to intricate tasks such as layer masking and retouching. The software's broad selection of filters, effects, and adjustment layers facilitates artistic enhancements, providing users with a spectrum of creative possibilities. Moreover, Photoshop supports various file formats, ensuring compatibility with different media and seamless integration with other Adobe Creative Cloud applications, enhancing overall creative workflows. The software's popularity is further buoyed by its active user community, fostering knowledge sharing, collaboration, and ongoing skill development through online tutorials and forums. In

essence, Adobe Photoshop stands as an indispensable tool, empowering users to actualize their creative visions and produce exceptional digital graphics.

Figure 2.2 Adobe Photoshop

2.3   Existing e-learning mobile application for kids

2.3.1   EXPLORING THE USE OF ESCRIBO PLAY MOBILE LEARNING GAMES TO FOSTER EARLY MATHEMATICS FOR LOW-INCOME FIRST-GRADE CHILDREN

Escribo play mobile learning games to foster early mathematics for low-income first-grade children. Persistent educational disparities affect children from underprivileged families globally. This study aims to evaluate the effectiveness of an evidence-based early mathematics intervention, utilizing instructional videos and learning games, designed for first-grade students living in poverty to engage in home-based learning. However, the study acknowledges limitations, including a lack of understanding about why some participants did not complete the intervention. Future studies may leverage multimodal learning analytics, potentially incorporating facial recognition engines using smartphone cameras to address these issues. The authors highlight the unknown reasons for non-completion among certain students and note the absence of data on the extent to which children in the control group received expected mathematics instruction during emergency remote teaching efforts.[1]

27
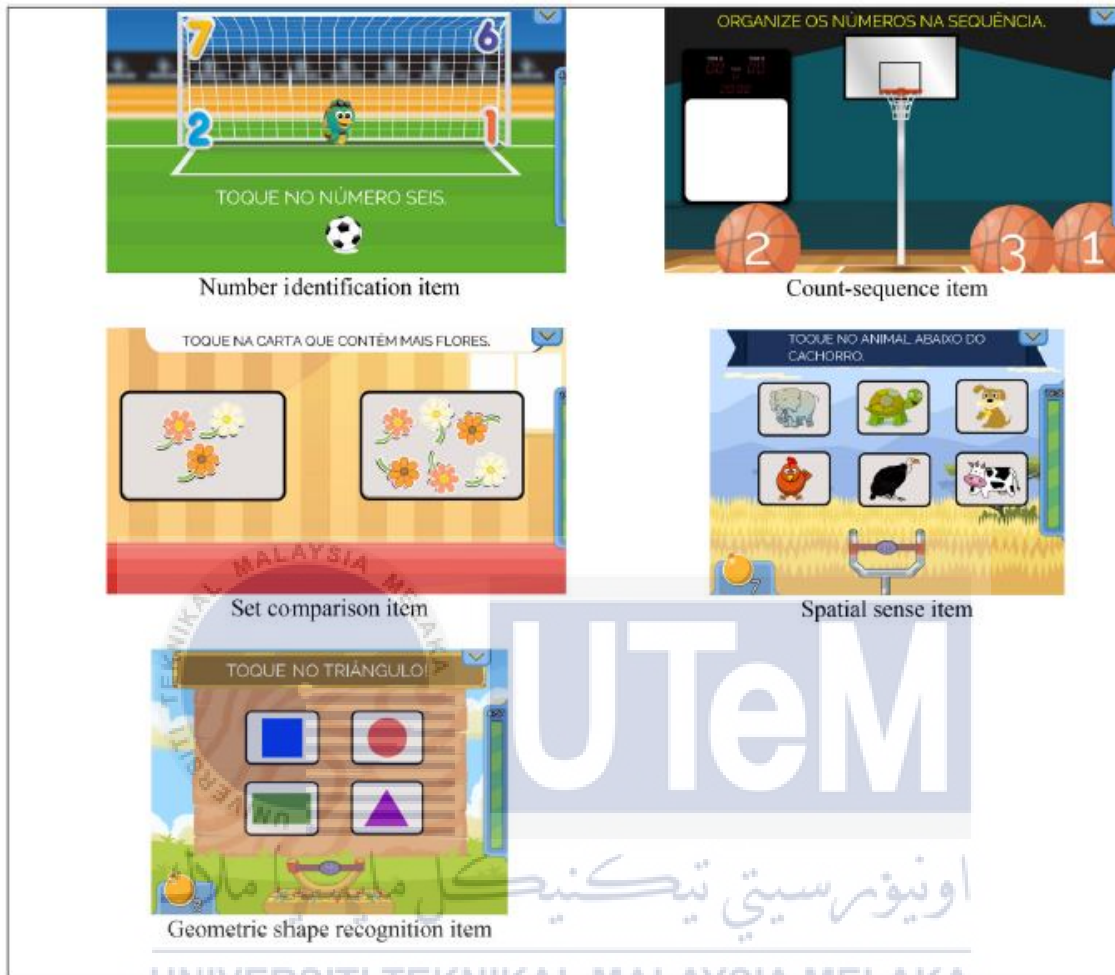
Figure 2.3 Selected GEMMA assessment items [1]

2.3.2 LEARNING TOOL FOR KIDS ON ANDROID PLATFORM

The Homy Kid Lesson application, designed for the Android platform, serves as a learning tool for children, focusing on numeracy, letter recognition, animal names, and basic calculations. Informed by research emphasizing the benefits of mobile learning in preschool education, this app integrates engaging elements like music and animation to provide an interactive learning experience. Particularly, in teaching mathematics to kindergarteners, the app aligns with research encouraging active student engagement. The design-based research method employed for teaching concept skills to developmentally disabled students is an innovative approach leveraging operant conditioning theory. This theory, focusing on behavior shaping through reinforcement and consequences, is integrated into software development, optimizing educational applications for the unique needs of developmentally disabled students.[2] Analysis of existing apps informs the creation of tailored educational tools, ensuring effectiveness and suitability for the distinctive learning requirements of this student group.

2.3.3 DEVELOPMENT OF MOBILE LEARNING ENGLISH WEB APPLICATION: ADOPTION OF TECHNOLOGY IN THE DIGITAL TEACHING AND LEARNING FRAMEWORK

The study, titled "Development of Mobile Learning English Web Application," underscores the transition from analog computation to digital technology as imperative. Early positive experiences with English in childhood are linked to subsequent language success. The utilization of web applications on mobile devices facilitates real-time learning, assessments, achievement record-keeping, and monitoring of learning session activities. The findings indicate that end users' perceived usability, usefulness, and attitudes significantly influence their intention to use mobile English learning web applications. The study focuses on a

digital teaching and learning framework that prioritizes end-users and mobile web application design and interfaces, with the aim of enhancing the English language learning experience for kindergarten students.The participants, experimental setting, vocabulary content, data collection methods, and testing of hypotheses are detailed in the study. The research objectives revolve around three main questions. Research Question One explores the practical outcomes of integrating digital content into the teaching and learning process of kindergarten students, assessing the tangible benefits of digital learning materials for English language acquisition. Research Question Two examines the impact of adopting a mobile learning English web application designed for kindergarten students on end-users' perception, addressing how the use of such applications affects attitudes, engagement, and overall language learning experience. Research Question Three explores the influence of age, gender, education, and occupation on end-users' perception of adopting a mobile learning English web application, investigating whether demographic factors shape users' perspectives on the application's value and effectiveness.[3] Ultimately, the framework developed in this study aims to create a digital English teaching and learning system tailored for kindergarten students, emphasizing end-user needs and incorporating mobile web application design principles to optimize the language learning process and provide an engaging educational experience for young learners.

2.3.4 DESIGNING AND DELIVERING DIGITAL LEARNING (E-LEARNING) INTERVENTIONS IN NURSING AND MIDWIFERY EDUCATION: A SYSTEMATIC REVIEW OF THEORIES

In the study led by Siobhan O'Connor from the Division of Nursing (2023), titled "Designing and delivering digital learning interventions in nursing and midwifery education," the authors reported that digital learning interventions have been part of nursing and midwifery education for over two decades. Learning management systems provide online platforms for

instructors to develop structured curricula and assessments, supporting remote education. Nurses and midwives are incorporating theoretical frameworks to comprehend the creation and implementation of various digital learning interventions. The review represents the first comprehensive synthesis of theories underpinning the planning and execution of digital learning methods. The use of digital learning accelerated during the coronavirus pandemic when remote learning became necessary for the safety of students and educators. The study identified various theories that contributed to informing and explaining the design and delivery of digital learning interventions.To conduct the review, the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) standards were followed, ensuring a thorough design, conduct, and reporting process. The authors highlight the long-standing use of theoretical models in nursing and midwifery professions to support pedagogical research and practice.[4] They define a theory as an organized, logical, and systematic articulation of claims responding to significant issues in a field of study, forming a substantial whole. The function of a theory is to serve as a metaphor for components of reality, describing, justifying, predicting, or prescribing actions, occurrences, conditions, or relationships.According to Polit and Beck (2018), theories empower researchers to delve beneath the surface of an event, enabling the identification of underlying mechanisms and the potential for prediction and control. While nursing and midwifery often draw from theories in other fields like psychology and education, the study found that behaviorist approaches, including those related to self-efficacy, social cognitive theory, and social learning theory, were most commonly utilized in nursing education. The research emphasized the importance of a more robust and consistent application of theories to enhance the understanding of student learning in these professions.

2.3.5 DESIGN FOR GAME-BASED LEARNING APPLICATION: AN EFFECTIVE INTEGRATION OF TECHNOLOGY TO SUPPORT LEARNING

This research aims to identify usability principles for developing an Augmented Reality (AR) game to enhance kindergarten students' learnability. The assessment outcomes, gathered through a questionnaire-based evaluation, indicate that students are highly satisfied with the game, ranking it as exceptionally engaging. The findings unequivocally demonstrate the remarkable effectiveness of integrating technology or game-based applications into the learning process for preschool children. A Paired Sample T-test, employed to compare means of two measurements taken from the same individuals or related units, indicates that the ABCD Augmented Reality application is more efficient. The time required by youngsters to solve the test after using the ABCD AR application alongside conventional learning was significantly less..[5]

The three phases of the research were all focused on reaching the intended research goal. In order to create an augmented reality (AR) game that improves kindergarten children' ability to learn, the first phase concentrated on the identification of usability principles. The objective was to compile pertinent guidelines that would direct the development process.

A validation process was carried out through professional assessments to make sure the derived usability principles were accurate and effective. Expert assessments are regarded as an essential tool for detecting potential downsides and weaknesses. The research team was able to acquire insightful information and improve the usability principles by asking for input and feedback from subject matter experts.The interaction with experts involved meetings and discussions where their expertise and perspectives were sought. The reviews obtained from these experts played a vital role in eliminating duplicate principles and organizing the usability principles into different categories. This categorization process helped streamline

the principles and ensure their relevance and applicability to the development of the AR game.[5] Following the identification and validation of usability principles, the research moved on to the development procedure of the ABCD-AR application. This phase involved the practical implementation of the gathered principles to create the AR game. The development procedure aimed to translate the theoretical concepts into a functional and engaging educational tool for kindergarten students. Lastly, the research discussed the strategy employed to evaluate the ABCD AR game. The evaluation phase aimed to assess the effectiveness and usability of the developed AR game. The strategy employed various methods to gather feedback and insights from users, such as kindergarten students and teachers. Through user feedback, the research team could identify areas of improvement, gather user perspectives, and validate the effectiveness of the AR game in enhancing learnability.

Overall, the research followed a comprehensive process, encompassing the identification of usability principles, their validation through expert reviews, the development procedure of the AR game, and the evaluation strategy to assess its effectiveness. This systematic approach ensures that the final product meets the desired research goal of creating an educational AR game that enhances the learning experience for kindergarten students.

2.3.6 DEVELOPING AND EXPLORING AN EVALUATION TOOL FOR EDUCATIONAL APPS (E.T.E.A.) TARGETING KINDERGARTEN CHILDREN

The Apple iPad, the first tablet-style device, was unveiled on April 3, 2010. It quickly became the preferred entertainment and educational tool in both formal and casual learning settings. More than 80% of the best-selling paid applications in the education category are geared toward kids, with 72% of them being created for preschoolers. Some apps are better

than others at encouraging a learning-by-doing approach and raising kids' levels of involvement in the educational process. A trustworthy, potent, quick, and simple solution that will help parents and/or educators make app selections is crucial. 218 participants from the Department of Preschool Education at the University of Crete in Greece participated in the study. In the winter 2019–2020 semester, these participants were either freshmen or sophomores taking a course on educational technologies. [6] They had some level of familiarity with educational apps. The participants were required to download three instructional apps for preschool-aged children as part of the study onto their smart mobile devices. These Greek-language applications were chosen because they had comparable material but different levels of quality. This made it possible to compare how the applications affected the users' perceptions and experiences.

Following established protocols to respect the ethical standards of informed consent and free participation, the researchers made sure that participation in the study was voluntary. There was no coercion or pressure used to compel participants to opt in or out of the study.

The study aimed to acquire useful insights and feedback from people with relevant knowledge and expertise by involving students from the Department of Preschool Education who were already familiar with educational apps. Their opinions and experiences would help researchers better grasp the efficacy and usability of the educational apps under investigation.

2.3.7 DEVELOPMENT OF GAME-BASED M-LEARNING APPS FOR PRESCHOOLERS

Despite significant opposition, the project "Development of Game-Based M-Learning Apps for Preschoolers" aimed to create mobile apps supporting young children's learning through game-based techniques. The apps feature a virtual world where a flower symbolizes a child's

34

unique participation and integration into the global community during gameplay. The NAEYC and the Fred Rodgers Centre advocate for technology integration in kindergarten based on strong developmental foundations, with educators mindful of challenges and opportunities. The project, guided by data from three phases, target audience participation, and theoretical studies, aligns with the CGPE's goal to create mobile apps supporting preschoolers' learning using game-based methodologies and addressing curriculum areas.

Employing the Design-Based Research (DBR) technique, the project combines technological development with empirical research in educational technology. Involving 10 children, where 4 had prior smartphone experience, their familiarity with tablet-based games wasn't affected. Most quickly adapted to the tablet (7/10), with disinterest in the remaining 3 attributed to factors like stranger anxiety, drowsiness, or ill health. Once engaged, all children sustained interest in gameplay for 20-30 minutes, aligning with the designed cognitive assessment tool timeframe.[7] Tapping on the tablet came naturally to the majority of children (9/10), while drag and drop gestures were more challenging for those without prior smartphone exposure and required practice to master. To avoid frequent switching between gestures, the games were clustered based on the type of response required, with tapping games administered first, followed by drag and drop ones. [26]

Figure 2.4 Print screens of games from the app Nature Kids Recycling [7]

Figure 2.5 Print screens of games from the app Nature Kids Plantation [7]

Figure 2.6 Print screens of games from the app Nature Kids Feed the Farm Animals [7]

2.3.8 AUGMENTED REALITY AND QR CODES FOR TEACHING MUSIC TO PRESCHOOLERS AND KINDERGARTENERS: EDUCATIONAL INTERVENTION AND EVALUATION

Education is undergoing transformation with the advancements in Information and Communication Technologies (ICT), and ongoing research aims to ascertain the benefits of ICT tools for the cognitive, emotional, and social development of young children. This study explores the effectiveness of employing ICT tools, specifically mobile devices and Augmented Reality (AR) programs using Quick Response (QR) codes, in preschool and kindergarten settings. The experimental aspect involves an educational intervention utilizing

innovative teaching techniques, such as cooperative and game-based learning, digital games, mobile devices, and AR technology (specifically QR codes), to teach the music curriculum in preschool and kindergarten.Collaborative Learning (CL), where a group of students collaborates to achieve a shared educational goal, forms the theoretical foundation. Social constructivism, an extension of traditional Piagetian constructivism, emphasizes the role of the social context in learning (Vygotsky, 1978; Phillips, 1969). The study explores the viability and effectiveness of using mobile devices and AR (QR) technology for preschoolers and kindergarteners, assessing their development in cognitive, emotional, and social domains through evaluation data.[8] The research investigates how students, under the guise of a game, acquire new knowledge about music and augmented reality. The findings reveal positive outcomes, including the practice of collaborative behaviors, learning novel problem-solving approaches, and offering/receiving assistance and encouragement from teammates across different groups. Improvement is observed in all three assessed domains, with the most noticeable enhancement in the cognitive domain.

Table 2-1 Progress achieved in the cognitive domain [8]

QUESTION	PRE-TEST	POST-TEST
MUSIC RHYTHM	4 (20%)	20 (100%)
VOICE PITCH	0 (0%)	17 (85%)
MEANING OF 'REFRAIN'	0 (0%)	18 (90%)
MUSICAL INSTRUMENTS/ CLASSES	5 (25%)	19 (95%)

The table presents the progress achieved in the cognitive domain based on the results of a pre-test and post-test. The cognitive domain refers to mental processes such as perception, memory, attention, and understanding. The table includes four different questions related to the cognitive domain, and it shows the number of correct responses and the corresponding percentages for each question in the pre-test and post-test.

2.3.9 DEFINING, DISCUSSING, AND EVALUATING MOBILE LEARNING: THE MOVING FINGER WRITES AND HAVING WRIT….

The development and current situation of mobile learning in the twenty-first century are covered in the study. It emphasises the development of knowledge and a unique community of practise centred on mobile learning, distinct from conventional e-Learning methods. Despite the large number of pilots and trials that have taken place in industrialised nations, there aren't any theoretical conceptualizations or evaluation techniques that are specifically geared towards mobile learning. Mobile learning is defined and conceptualised differently by different proponents, depending on whether they are concentrating on the tools and technology or highlighting the flexibility of the learners and their interaction with mobile devices. However, the study contends that the mobile learning community needs a conceptual foundation in order to have authority and credibility.

Mobile learning is described as being located, personal, and contextual, which makes it difficult to define and assess. Due of its distinctive characteristics, it frequently aligns with informal learning as opposed to the formal learning environments present in conventional educational institutions. This prompt worries about the potential loss or compromise of these qualities in extensive and ongoing mobile learning implementations. The report also recognises how wireless, mobile, and portable gadgets have changed not only education but also a number of societal spheres like discourse, knowledge, art, employment, language, commerce, deprivation, and crime. The ability to access knowledge and information at any time and from any location questions the value of traditional education and forges dynamic connections between learning, society, and technology. The study examines how mobile learning has evolved, considers the need for theoretical conceptualization and evaluation procedures relevant to mobile learning, and emphasises the difficulties and links between mobile learning and broader societal developments.

The utilization of wireless, mobile, portable, and handheld technology is on the rise and diversifying across all educational sectors, irrespective of economic status, in both affluent and developing nations. Small-scale, short-term trials are rapidly giving way to larger, more prolonged, and blended deployments. This article examines the potential future and nature of mobile education using recent articles, projects, and trials. The article then examines the relationship between the challenges of rigorous and appropriate evaluation of mobile education and the challenges of embedding and mainstreaming mobile education within formal institutional education.[9]

2.3.10 DESIGN AND EMPIRICAL EVALUATION OF A MULTITOUCH INTERACTION GAME-LIKE APP FOR FOSTERING EARLY EMBODIED MATH LEARNING

The prevalence of educational apps for kindergarteners often lacks a solid scientific foundation. This study presents a theory-driven approach to multitouch software development aimed at promoting early math skills in kindergarten students. The app, designed with game-based learning principles and informed by early numerical development concepts, focuses on training finger-based numerical methods to automate motor patterns within a numerical context. The study involved 15 kindergarten-aged children, and the results align with prior research in this domain.[10] The app adheres to recommended interaction design guidelines for kindergarten-aged children and stands out as one of the few multitouch-interaction-based math learning apps providing child-centered guidance on its goals. The researchers emphasize the need to resist universal design standards for young children and advocate for further research to understand how touchscreen interaction varies by age, unlocking the full instructional potential of learning apps.
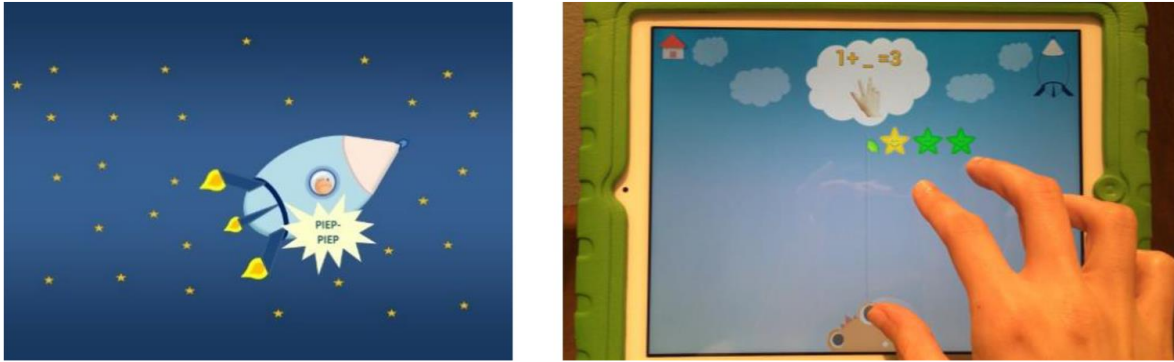
Figure 2.7 Scene from the app's introductory narrative (left) as well as a gameplay picture of game "Calculate" (right) [10]

2.3.11 DEVELOPMENT OF MOBILE APPLICATION UPON MECHANICAL ENGINEERING STUDENTS' LEARNING STYLES

This study investigates the influence of mobile application development on the learning preferences of mechanical engineering students, emphasizing the flexibility of mobile learning in terms of time and location. The design of PolyMES, aligned with the learning styles of these students, successfully achieved the study's objectives. Mobile learning, viewed as a tool providing students with a competitive advantage in the IT revolution, equips them with essential skills for academic success and future career excellence. The feasibility of implementing mobile learning in Malaysia is supported by the prevalence of personal devices such as smartphones, laptops, tablets, and similar gadgets among students, involving 430 broadband centers in the analysis.A quantitative approach was employed in this study, utilizing questionnaires to gather data on learning styles and mobile device usage patterns among mechanical engineering students before the development of the mobile app. The majority of students were found to use Android platform mobile devices and exhibited all four dimensions of the Felder-Silverman learning styles model. The data collected underwent analysis using a descriptive design. Post-development of the mobile app, its validity was assessed through expert feedback, focusing on face and content validities for

40

construct validity. Reliability, measured through internal consistency (Cronbach's alpha), was determined to be sufficiently high and acceptable.[11] Future research opportunities include exploring the conceptualization of mobile learning in this study and addressing potential limitations. Subsequent studies may involve assessing lecturers' abilities to instruct and teach students via mobile learning.

2.3.12 E-LEARNING MOBILE APPLICATION EVALUATION: AL-ZAYTOONAH UNIVERSITY AS A CASE STUDY

This study explores the quality factors influencing the utilization of the Elearning.ZUJ mobile application by students and instructors at Al-Zaytoonah University of Jordan, with a particular focus on the impact of the COVID-19 pandemic. The research aims to assess how well these quality factors align with the expectations and needs of both students and instructors engaging with the application. The study involved 931 students, and certain findings are in line with existing research in this domain.[12] By contributing to the understanding of the pedagogical use of mobile applications in higher education, this research adds to the existing knowledge base. In acknowledging potential limitations, the researchers suggest that future studies can address these shortcomings.

2.3.13 HYBRIDPLAY: A NEW TECHNOLOGY TO FOSTER OUTDOORS PHYSICAL ACTIVITY, VERBAL COMMUNICATION AND TEAMWORK

Introducing the HybridPLAY platform, a novel combination of video games and sensing devices designed to encourage verbal dialogue, physical activity, and teamwork. With a focus on combating childhood obesity and promoting outdoor exercise, HybridPLAY transforms traditional playgrounds into interactive game environments through the integration of wireless sensors. These sensors convert movements such as walking, jumping,

41

running, turning, and beating on playground equipment into actions that control digital games.The research, conducted by four teams, emphasizes that HybridPLAY is a unique platform comprising sensor units and video games, fostering teamwork, communication, and outdoor physical exercise. The third edition of the system underwent a quantitative evaluation, yielding excellent results attributed to various enhancements. This study advances the development of physical controls for video games on integrated mobile devices, utilizing a network of wireless sensors affixed to playground equipment like swings, slides, and seesaws. The HybridPLAY system seamlessly translates movements performed during play into inputs for the corresponding actions in the digital game, merging physical and digital interactions.This innovative approach creates outdoor gaming experiences that blend digital game strategies with street game dynamics. By incorporating verbal and corporal communication and promoting team playing, HybridPLAY aims to deliver a distinctive and engaging gaming experience that harnesses the benefits of both physical and digital mediums..[13]

2.3.14 MACHINE-LEARNING-BASED SUITABILITY PREDICTION FOR MOBILE APPLICATIONS FOR KIDS

This paper introduces an approach based on machine learning to predict the appropriateness of mobile apps for children. The methodology employs natural language processing (NLP) techniques to preprocess user reviews of the apps. Feature engineering involves extracting elements like abusive words from the bag-of-words (BOW) representation of the reviews, resulting in a feature vector for each app. A support vector machine (SVM) classifier is trained and evaluated on these feature vectors.The effectiveness of the proposed approach is assessed using the 10-fold cross-validation technique, revealing the model's significance. The primary objective is to automate the classification of apps suitable for children, thereby

enhancing children's safety from potentially harmful content in digital media and fostering quality education and development. Given the diverse landscape of mobile applications, determining their appropriateness for children can be challenging. The utilization of a support vector machine classifier is suggested for efficient identification. The proposed model processes user reviews, conducts textual analysis to compute review scores, and combines preprocessed data with each review score to generate a vector for training and testing the model. The results of the 10-fold cross-validation demonstrate notable improvements in the precision, recall, and f-measure of the proposed model, with increases of up to or more than 42%, 51%, and 46%, respectively. [15]

2.3.15 MOBILE AND ADAPTIVE LEARNING APPLICATION FOR ENGLISH LANGUAGE LEARNING

Mobile learning is recognized as a new phase in e-learning, offering the opportunity for more effective and efficient study methods. The utilization of mobile devices for learning has become increasingly sophisticated and impactful, providing both students and professors constant access to learning materials from any location. The portability, affordability, and connectivity features of these devices have spurred the development of various approaches and systems, with a plethora of applications designed for mobile learning.Researchers have leveraged this technology to enhance student learning, particularly in the realm of foreign language acquisition, such as learning English. This essay proposes an educational method that empowers students to acquire the English language outside the traditional classroom setting, encouraging active participation in their own education. The emergence of mobile learning (M-learning) is acknowledged as a new educational approach driven by rapid advancements in mobile and information and communication technology (ICT). The widespread use of mobile devices, especially smartphones, is emphasized for

communication and information processing, making them integral tools for teaching and learning.M-learning is positioned as a solution to address challenges in education, such as time constraints, costs, flexibility, and interactivity. However, the authors recognize potential issues with M-learning environments, including isolation and diverse learner abilities, preferences, and characteristics. In response, they propose the development of an M-learning system tailored for English language learning, encompassing various language acquisition aspects like speaking, writing, grammar, and listening skills. The paper outlines the structure, modules, and functionalities of the proposed approach and details the validation process and results. The authors aim to provide an adaptable and personalized learning experience through the developed mobile application.[16]To effectively learn English, proficiency in speaking, listening, reading, and writing is essential. The researchers propose an educational Android app for mobile learning to address this need. The app aims to create a mobile environment for basic English language instruction, with a key objective being to deliver the right resource to each learner at the right time and in the most effective manner. The system is designed to accommodate the diverse needs, levels, and preferences of learners. Mobile learning allows students to engage in learning at their convenience, whether during travel, free time, at home, work, or elsewhere. The proposed system, while having some flaws identified by learners, has received feedback that includes suggestions for enhancing features and improving communication between learners and instructors. The authors plan to address these suggestions and provide various adaptation options for students with different backgrounds and skill levels. Additionally, the use of mobile agents to enhance learning and adaptation is considered. Finally, the authors propose comparing their system with existing ones to highlight its strengths and weaknesses.

2.3.16 EVALUATING IMPACT OF MOBILE APPLICATIONS ON EFL UNIVERSITY LEARNERS' VOCABULARY LEARNING

The evaluation of the effectiveness of mobile applications in enhancing the vocabulary of English as a Foreign Language (EFL) university learners is the focus of this review. The authors underscore the distinctive features of mobile apps, such as portability, multimodality, interactivity, and ubiquity, making them popular tools for personalized and autonomous learning. The goal is to assess the impact of mobile apps on vocabulary improvement, utilizing a methodology involving an extensive literature search in databases like Web of Science, Scopus, and Google Scholar. The selected studies, published from January 2017 to July 2020, underwent careful scrutiny, resulting in the inclusion of five research studies for analysis.[17]The findings highlight the efficacy of mobile apps in supporting vocabulary retention and practice, aligning with the traditional classroom's input interaction-feedback pattern. However, the selected studies predominantly used mobile apps as supplementary tools rather than standalone resources, with only two studies exploring independent app usage. The review underscores the importance of guided and controlled implementation to ensure effective learning processes. The authors advocate for future research to focus on rigorous empirical studies, with a particular emphasis on the employed methodology.Mobile applications play a crucial role in enhancing the vocabulary learning of EFL university learners, especially considering the widespread usage of smartphones among young individuals. While mobile apps offer learner-centered and personalized experiences, responsible and proactive student engagement is necessary. In the context of EFL learning, mobile apps are particularly utilized for vocabulary development due to their segmented content that aligns with smartphone displays. However, the review notes that many vocabulary apps lack strong pedagogical foundations, emphasizing the need for collaboration between app developers and English language teaching (ELT) professionals,

as well as input from end users (students).Learning new vocabulary is integral to language skills improvement, impacting reading, listening, speaking, and writing abilities. The review aims to assess the effectiveness of EFL mobile apps in vocabulary enhancement, exploring whether they have a significant, moderate, or no effect on vocabulary improvement. The literature search covered the period from January 1, 2017, to July 31, 2020, with a focus on peer-reviewed journal publications in English that targeted university students and were original experimental or quasi-experimental research. The inclusion criteria also considered the presence of an experimental and a control group, while exclusion criteria involved distinct age groups, different research themes, studies lacking experimental and control groups, conference papers, and reviews. The comprehensive search resulted in the analysis of five studies to provide insights into the effectiveness of mobile applications in enhancing EFL university learners' vocabulary.

2.3.17 MOVING HOME LEARNING PROGRAM (MHLP) AS AN ADAPTIVE LEARNING STRATEGY IN EMERGENCY REMOTE TEACHING DURING THE COVID-19 PANDEMIC

The Covid-19 pandemic significantly impacted early childhood education, resulting in widespread learning losses across various aspects of child development. To address this challenge, the Moving Home Learning Program (MHLP), a house-to-house learning initiative, emerged as a promising solution for urgent remote teaching. This study aims to showcase the utilization of the MHLP in home-based learning, utilizing a qualitative methodology involving interviews, observations, and recordings. The participants included a kindergarten principal and four teachers, and the research data were analyzed through content analysis.The findings indicate that the MHLP has adequately met the learning demands of early children during the pandemic. However, certain challenges were identified, such as the distance from home, infrequent meetings, external disruptions like food and toy

vendors, concentration issues, and potential property damage at home. Despite these limitations, the study suggests that the MHLP serves as an adaptive technique requiring attention from policymakers, school administrators, and teachers to develop more effective online learning models. In contrast, the text highlights the challenges faced by early childhood education (ECE) institutions in implementing online learning during the pandemic. The rapid transition to online learning, termed emergency remote teaching, poses difficulties in adopting suitable techniques, acquiring internet access, and maintaining direct communication between teachers and students. Parents express concerns about the effectiveness of online learning for early childhood education, emphasizing the importance of in-person interaction and parental involvement. The argument is made against online learning in ECE due to its limitations in providing active and meaningful experiences, potentially negatively impacting children's physical, psychological, and social aspects.To address the drawbacks of online learning, the book proposes proactive measures and suggests creative and flexible learning approaches, such as the MHLP. The study aims to detail the MHLP's implementation, identify obstacles, and offer fresh approaches to navigate the challenges of online learning in early childhood education. The field findings suggest that while the MHLP may mitigate learning loss, its effectiveness requires better design and development during implementation.[18] The study, conducted with limited participants, serves as a reference for other ECE institutions, offering insights for improvement or the development of new learning models during the pandemic.

2.3.18 THE DESIGN AND IMPLEMENTATION OF AN ARABIC PRONUNCIATION APPLICATION FOR EARLY CHILDHOOD

The importance of preschool education in facilitating the optimal development of a child's identity and laying the foundation for future academic success is widely recognized. Early

childhood experiences play a crucial role in shaping the architecture of the brain and influencing cognitive and social skills development. The formative years, particularly from 0 to 8 years, are critical for learning and language development. Parents have a significant responsibility to provide purposeful education to their children, equipping them with essential life skills and fostering independence and productivity. Play is recognized as an important tool for children's development, allowing for interaction and the expansion of their perceptions. In the modern era, technological advancements offer opportunities to facilitate learning through applications. This study focuses on enhancing listening and pronunciation skills in preschool children by teaching them the Arabic alphabet and connecting each letter with corresponding sounds and pictures. The objectives include improving listening skills, enhancing focus and sensory engagement, teaching correct pronunciation and letter recognition, introducing simple words with visual aids, improving the user interface of the application, and promoting child development and learning.

First, a survey of the literature was done to look at earlier studies on the Arabic Pronunciation Application. The second phase involved distributing a questionnaire via social media to a variety of individuals, including parents, instructors, students, and experts in brain training and psychological counselling. In order to encourage early learning before entering school, the questionnaire sought thoughts on the use of educational applications to teach youngsters how to pronounce Arabic words correctly. There were 605 people that answered the survey, which constituted a sample size. In the third step, a psychological counsellor with expertise in children's education was interviewed. The conversation focused on techniques for teaching the fundamentals of Arabic as well as tactics for enlivening and developing kids' minds. The design and implementation of the application, which drew from theories of mental development like Piaget's theory, were part of the fourth stage. With an emphasis on the three main formats (fatha, dama, and kasra), the application was created to aid children

48

with pronouncing Arabic letters correctly.Finally, usability testing was carried out utilizing pre-test and post-task questionnaires to collect user feedback on the overall application, assess task-specific usability, and collect participant background information.

A questionnaire was distributed via social media to gather information and opinions from parents, teachers, students, and professionals in the field. The questionnaire received responses from 605 participants, and their feedback was analyzed to understand user requirements and objectives. An interview was conducted with a psychological counselor specializing in children's education to gain insights into teaching methods and strategies. Based on this information, the application was designed and implemented, focusing on correct pronunciation of Arabic letters and the three primary formats. Usability testing was carried out using pre-test and post-task questionnaires to evaluate user experience and gather feedback. The findings from the questionnaires and usability testing were statistically analyzed to identify areas for improvement and make recommendations. The paper discusses the data collection process, analysis methods, and the results obtained. The future recommendations include expanding the application to iOS devices, creating a web-based version, incorporating additional features like scoring in the training section, and developing the application for different levels of primary schools and children with disabilities. The system analysis phase was crucial in identifying and addressing the problem areas, allowing for a systematic approach to developing the application that aligns with user requirements and objectives.[20]

2.3.19 THE ROLE OF MACHINE LEARNING IN E-LEARNING USING THE WEB AND AI-ENABLED MOBILE APPLICATIONS

The landscape of learning methods and processes has significantly transformed due to information technology, capitalizing on its potential, accessibility, and diverse

functionalities. Educators are leveraging various technology-based applications to provide easy access and a more structured approach to learning. Students are increasingly drawn to learning environments that offer flexibility in accessing materials at their convenience, a feature often lacking in traditional classrooms. E-learning, requiring no travel or lodging, is more resource-efficient compared to classroom instruction, a benefit appreciated by students. It also diminishes the impact of biases since factors like age and appearance matter less in a virtual setting.One notable aspect highlighting the effectiveness of e-learning over classroom learning is its positive influence on attitudes and learning outcomes. The practical application of acquired knowledge enhances memory retention, boosts exam scores, and improves the ability to apply learned concepts. Recent research in the e-learning field has particularly focused on mobile-based learning due to its increased flexibility and accessibility. However, this shift presents challenges for mobile application developers, such as addressing screen zooming issues to ensure a satisfactory user experience across various screen sizes.As e-learning continues to expand and generate substantial data, efficient storage and a feedback loop for continual improvement become imperative. This feedback loop is crucial for meeting user needs, enhancing the learning experience, and ensuring long-term user satisfaction. Although efforts are underway to gather more data from diverse users utilizing mobile applications for e-learning, the retrieval and analysis of this data present greater complexities compared to websites. It's essential to recognize that the effectiveness of e-learning extends beyond technology itself.While mobile applications provide a convenient platform for learning, factors such as instructional design, pedagogical strategies, and user engagement also play crucial roles in making learning more effective. Therefore, it is necessary to consider these aspects in addition to technological considerations when designing and developing mobile e-learning applications.[21] The research in mobile-based e-learning highlights the importance of addressing challenges like screen zooming and the

need for continual improvement through a feedback loop. While technology is an integral part of e-learning, it is essential to recognize the broader factors that contribute to effective learning experiences. By considering both technological and instructional aspects, developers can create mobile applications that provide a seamless and effective learning environment for users. E-learning can be delivered through both websites and mobile applications, but these mediums differ in terms of accessibility and other factors that affect the learning experience, as identified in this study. Each medium has its strengths and is suitable for different situations depending on the user's end goal. However, gathering a substantial amount of data is necessary to gain a better understanding of users' profiles and preferences. In this context, e-learning service providers often show a preference for mobile applications, as they offer convenience and accessibility. Websites, on the other hand, may be favored as a medium for e-learning due to certain advantages they provide. However, it is crucial to consider the specific needs and preferences of learners when deciding on the appropriate medium for delivering e-learning content. To further advance knowledge in this area, future research should aim for larger sample sizes that are highly diversified in terms of age, gender, courses, and technological skills. This would enable a more comprehensive understanding of the preferences and behaviors of different user groups, allowing for more tailored and effective e-learning experiences.

2.3.20 THE EFFECT OF USING E-LEARNING TOOLS IN ONLINE AND CAMPUS-BASED CLASSROOMS ON STUDENT PERFORMANCE

During the 2006-2007 academic year, around 12.2 million students enrolled in college-level, credit-granting Distance Education (DE) courses in the United States. Online courses constituted 77% of these enrollments, while hybrid/blended courses comprised 12%, and other DE courses, including correspondence courses, made up 10%. The surge in online

51

courses was fueled by students' demand for flexibility in scheduling and increased access to education. The shift in instructional approaches was also noted, as instructors transitioned from authoritarian and non-interactive courses to more student-centered and interactive learning experiences. This evolution empowered students with greater control, engaging in two-way communication and participating in group-oriented activities.E-learning, facilitated by computer networked technology, has seen a rise, incorporating web-based resources like audio, video, wikis, blogs, podcasts, social networks, video-sharing sites, and virtual worlds. Learning Management Systems (LMS) such as WebCT, Blackboard, DesireToLearn, and Moodle played a significant role in supporting DE, providing instructors with tools for course management, learning processes, and data repositories. Technological advancements in DE hold the potential to transform education and offer new learning opportunities, but despite these advances, attrition rates in online education remain high.Factors impacting student success in DE include student characteristics (such as age, familiarity with higher education, and computer proficiency), learning styles, and learning environments. Online students tend to be older, with a higher proportion of females in online courses. The passage underscores the need to investigate learning outcomes between online and campus-based platforms and emphasizes the importance of strong theoretical frameworks, compatible implementation and assessment methods, and clear research methodologies. It also suggests exploring variables like perceived usefulness, ease of use, computer self-efficacy, computer anxiety, the ability to work independently, and course performance in the context of information systems and education.In summary, the discussed study aims to explore how students perceive e-learning tools in online and campus-based courses, with a focus on evaluating the extent to which these perceptions can predict course grades. The study seeks to contribute to existing literature by comparing online and campus-based student performance and examining relationships between various variables. [22]

2.3.21 USE OF A MOBILE LEARNING APPLICATION IN THE PROCESS OF FOREIGN VOCABULARY LEARNING

In contemporary times, proficiency in multiple languages is increasingly vital and beneficial. Being able to communicate in a foreign language facilitates connections with individuals from diverse cultures, enriching overall understanding. Numerous researchers (Smith, 2010; Johnson, 2012; Lee, 2015) underscore the importance of vocabulary acquisition as a central element in language learning. A solid grasp of vocabulary is crucial for developing language skills. Vocabulary acquisition involves intentional and incidental learning activities, complementing each other and contributing to learners' vocabulary expansion, ultimately enhancing communication. These activities can take place in various settings, such as traditional classrooms or technology-based learning environments, each offering unique approaches to language learning, including vocabulary acquisition. A study by Mahdi (2018) suggests that combining traditional teaching methods with technology-based learning tools can create an enjoyable and stimulating learning experience. This study focuses on the utility of a mobile application in blended English language learning, specifically emphasizing vocabulary development. Conducted at a Secondary Vocational School in Slovakia, the research employed diverse methods to explore vocabulary expansion through the mobile application. The results revealed the effectiveness of the vocabulary mobile learning application, as evidenced by students' performance and overall satisfaction. These results align with previous studies that implemented mobile-assisted language learning (MALL), indicating improved performance, vocabulary knowledge, retention, and positive student attitudes towards mobile learning. The use of mobile applications in vocabulary learning was found to enhance understanding, precision, and motivation among students. Overall, this study reinforces the benefits of incorporating mobile applications into language learning for

vocabulary acquisition and highlights the positive impact on student outcomes and perceptions.

2.3.22 WIRELESS WEB KIDS – MOBILE LEARNING IN PRIMARY AND SECONDARY EDUCATION

This project introduces third-grade primary education pupils (10-12 years old) to ICT in mobile technology using software applications like WEB 2.0, GPS, and PDAs. Through interactive whispering stories, secondary education students create competitions where primary education students visit a specific region and find answers to questions using online resources. The project involves company visits, interviews with ICT specialists, and collaboration with the University of Hasselt. Students publish their work on an online platform, gaining insights into ICT-related professions. The interdisciplinary project covers scientific domains such as Web 2.0, multimedia, information science, and language. Training is provided to teachers, and the project culminates in the presentation of digital stories.[25] The WW-Kids project aims to popularize sciences and technology by creating whisper stories using mobile devices. Secondary education students develop these stories, which are then used by primary education students. Collaboration with companies, universities, and newspapers is crucial. The main goal is to inspire students, starting at a young age, to pursue exact sciences and technology studies. Additionally, the project may explore the possibility of expanding to a European level in the future.[25]

2.3.23 MOBILE APPLICATION PROTOTYPE: LEARNING IN THE PROGRAMMING COURSE IN COMPUTER ENGINEERING STUDENTS

The worldwide COVID-19 pandemic has necessitated a reevaluation of education systems, leading to school and university closures. Technology has played a crucial role in facilitating remote learning and working from home, with programming being a vital skill in this context. Programming is essential for technological development, and its significance extends to various industries. The Latin American continent, however, lacks sufficient programming experts to become a global leader in software and information technology. To address this, it is important to encourage children and young people through seminars and courses to engage in computer science research. By fostering innovation and embracing new methods, countries can experience economic and social growth. This research aims to assist students, particularly in the field of computer engineering, by developing a mobile application that enhances their learning experience. The study utilizes the Design Thinking methodology to understand and address the needs of users effectively. The objective is to implement a prototype mobile application that improves the didactic learning of programming language courses for first-cycle students. The paper consists of a literature review, methodology, case study, results and discussion, conclusion, and future work.[27] In conclusion, the designed mobile application aims to assist first-cycle computer science students by addressing their specific difficulties and providing a didactic learning experience. The application incorporates a chatbot to guide users through their learning journey and ensure favorable outcomes. The use of the Design Thinking methodology has been effective in understanding user needs and developing the application prototype. The goal is to facilitate and enhance programming education, offering free programming language courses within the application. The intention is to further develop and implement

55

the software in the future, benefiting students and individuals worldwide who seek to expand their programming knowledge.

2.3.24 DEVELOPMENT OF INSVAGRAM: AN ENGLISH SUBJECT-VERB AGREEMENT MOBILE LEARNING APPLICATION

English has emerged as the global lingua franca, fostering international communication and significantly impacting daily life, thanks to technological advancements. In the Philippines, English is pivotal, remaining a key subject in the education system despite discussions about a shift to a Filipino-based language. The COVID-19 pandemic has disrupted education, leading to the adoption of online classes, which bring both advantages and disadvantages, particularly in developing nations like the Philippines. A decline in English proficiency among Filipinos is evident, highlighted by their poor performance in reading, math, and science in the Program for International Student Assessment (PISA). Globalization has left its mark on the Philippine economy and education, emphasizing the need for employability skills and the integration of technology in teaching and learning. Faculty members must adapt to current trends and methodologies to effectively prepare students for the complexities of the modern world.Curricula should align with the needs of the economy and labor markets to ensure relevance and responsiveness.[29]

2.3.25 E-LEARNING MOBILE APPLICATION EVALUATION: AL-ZAYTOONAH UNIVERSITY AS A CASE STUDY

Mobile technologies have the potential to enhance innovative educational methods and improve academic performance and skills among students. Nevertheless, there is inconsistency in the outcomes concerning the impact of mobile devices on education. This

research seeks to explore the determinants influencing students' utilization of an E-learning mobile application for academic purposes, with a specific emphasis on the integration of mobile applications within a particular university in Jordan. The research is significant as it contributes to the limited literature on the educational use of mobile applications in higher education institutions. The study will analyze various student, institutional, and academic variables to gain insights into mobile application utilization and provide recommendations for increasing adoption. The empirical data collected in this study will contribute to the fields of technology and academia by predicting adoption and indicating E-learning mobile application acceptance. The paper is structured with a literature review, hypotheses creation, research strategy explanation, presentation of empirical findings, and conclusion with implications.[30] This study examines the influence of quality factors on the use of the Elearning.ZUJ mobile application at Al-Zaytoonah University of Jordan. The findings show a positive relationship between perceived reliability, demand, and various quality factors. Perceived benefit is also positively related to the intention to use E-learning mobile applications. The study emphasizes the significance of quality elements in E-learning apps and their impact on user demand. However, future research is needed to address any limitations identified in the study.

2.3.26 AN EXPLORATORY STUDY OF MOBILE-BASED SCENARIOUS FOR FOREIGN LANGUAGE TEACHING IN EARLY CHILDHOOD

The article delves into the contemporary significance of foreign language proficiency, showcasing how it is highly valued by employers, providing students with increased academic and professional opportunities. In response to this trend and the demand for modern communication methods, the article explores the integration of cutting-edge language teaching approaches, particularly through information, communication, and

57

ubiquitous technologies (ICT).The authors focus on the rising trend of personalized learning via mobile devices, attributing its popularity to the widespread use of smartphones and personal devices. While acknowledging concerns about access, security, affordability, and digital proficiency, the article emphasizes the undeniable convenience of mobile devices for informal education. The core argument revolves around how these devices can significantly contribute to individualized language learning experiences.

The study then introduces two mobile learning apps, Mondly Kids and Language Drops-Kahoot, selected for their efficacy in facilitating language learning through engaging and interactive settings tailored to children's age groups. The authors demonstrate the implementation of these apps in English and Spanish language classrooms, presenting examples of student work and sharing insights gained from three distinct groups of students.The research explores the intrinsic and extrinsic motivational aspects of mobile learning, particularly in the context of Generation Z students who are accustomed to constant connectivity through social media and mobile devices. The article emphasizes the need for educators to leverage students' connected and collaborative world, encouraging a more active involvement in language learning.Towards the end, the study critically evaluates various digital educational tools, ultimately selecting Mondly Kids and Language Drops-Kahoot as exemplary instructional resources. The authors conduct a thorough assessment across different age groups, affirming that mobile language learning not only enhances children's experiences but also increases their enthusiasm for acquiring a new language. Additionally, the study suggests that mobile applications contribute to improving students' speaking abilities and critical thinking skills during language learning sessions.The article highlights the importance of digital tools in language teaching across diverse age groups, asserting their role in enhancing oral and written communication skills, critical thinking, and

information analysis. The study concludes by suggesting future research directions, including exploring self-access learning in mobile apps and addressing teacher concerns related to the integration of technology in language instruction. Overall, the article contributes valuable insights into the dynamic landscape of language education, emphasizing the crucial role of digital tools in elevating the quality of educational work. [31]
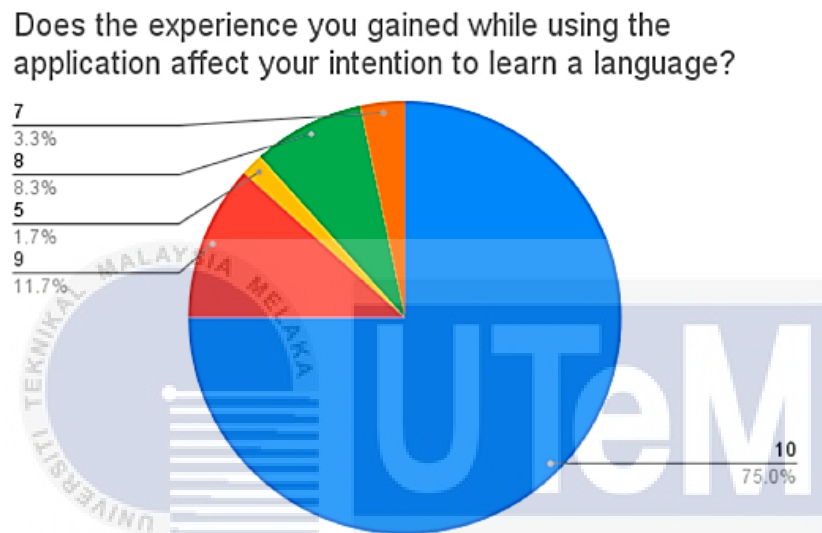
Figure 2.8 Intention to learn a language after using both of the applications (on a scale of 1–10 where 1 = Definitely no and 10 = Definitely yes). [31]

2.4   Summary of Literature Review

2.4.1   Comparison Of Previous Related Projects

Table 2-2 Comparison of Previous Related Project [2]

Answer	Number of Respondents	Percentage
Very Attractive	30	58%
Attractive	22	42%
Less Attractive	0	0%
Not Attractive	0	0%

The table represents the responses from a survey of Learning Tool for Kids on Android Platform [2] where participants were asked to evaluate attractiveness levels, including "Very Attractive," "Attractive," "Less Attractive," and "Not Attractive." Out of the 30 respondents, 58% found the subject "Very Attractive," while 42% found them "Attractive." No respondents rated the subject as "Less Attractive" or "Not Attractive." The table also includes a column titled "Previous Related Project," but it appears to be empty or not provided with information in the given context. Overall, the majority of respondents found the subject attractive, with a notable percentage considering them very attractive.

Table 2-3 Comparison of Previous Related Project [5]

	Mean	N	Standard Deviation	Std. Error/ Mean
Initial Test Score	4.37	30	1.608	0.294
Post Test Score	7.97	30	1.650	0.301

The table provides information of Design for Game-based Learning Application: An Effective Integration of Technology to Support Learning [5] on two sets of test scores.Initial test scores and post-test scores. For the initial test, the mean score was 4.37, based on data from 30 participants, with a standard deviation of 1.608 and a TSid - Error/Mean value of 0.294. In the post-test, the mean score increased to 7.97, again based on 30 participants, with a standard deviation of 1.650 and a TSid - Error/Mean value of 0.301. These values offer insights into the central tendency, variability, and error characteristics of the test scores in both the initial and post-test scenarios.
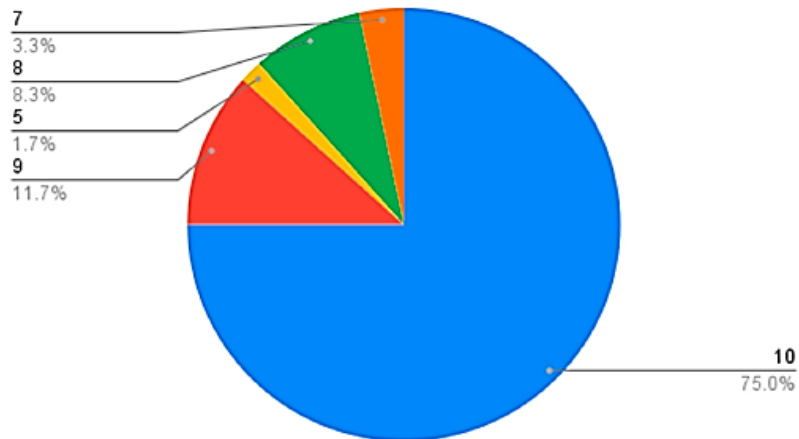
Figure 2.9 Comparison of Previous Related Project [31]

The survey results reveal a overwhelmingly positive correlation between users' experience with the language learning applications and their intention to continue language learning. A staggering 75% of respondents rated their intention to learn a language at the highest scale of 10, reflecting a strong and affirmative impact on their motivation. Furthermore, 11.7% of participants rated their intention at 9, emphasizing a high level of positive influence. Even the lower percentages, such as 8.3% at 8, 3.3% at 7, and 1.7% at 5, still signify a generally favorable inclination toward continuing language learning post-application use. These findings underscore the significant role that the user experience of language learning applications plays in influencing individuals' determination to pursue language acquisition, suggesting that a positive and engaging application experience can be a powerful catalyst for sustained language learning efforts.

2.4.2   Comparison Of Previous Related Projects With Play And Learn

Table 2-4 Pretest and posttest results

Project Title	Total children	Pretest	Average (Pretest)	Posttest	Average (Posttest)
Title [5]	30	6	0.2	10	0.33
Title [31]	26	15	0.57	20	0.77
PLAY AND LEARN	73	58	0.79	68	0.93

In the context of three different projects, Design for Game-based Learning Application: An Effective Integration of Technology to Support Learning [5], An Exploratory study of Mobile-Based Scenarious for Foreign Language Teaching In Early Childhood [31] and PLAY AND LEARN.Total of 30, 26, and 73 children participated, respectively. Assessing the initial understanding of the subjects, pretest scores were recorded with 6, 15, and 58 for projects respectively. The average pretest scores, represented as percentages, were 0.2, 0.57, and 0.79 for the respective projects. Following an intervention or educational period, posttest scores were documented as 10, 20, and 68 for project1, project2, and PLAY AND LEARN, respectively. The corresponding average posttest scores, presented as percentages, saw increases to 0.33, 0.77, and 0.93. These figures suggest varying levels of improvement in the understanding of the subjects across the projects, with PLAY AND LEARN exhibiting the highest average posttest score, indicating significant progress in the participants' comprehension during the course of the learning activities.

Table 2-5 Visual design and Interface results

Projects	Total children	visual design (Atractiveness)	Average
Learning Tool for Kids on Android Platform	52	30	0.58
PLAY AND LEARN	73	73	1

Average=$\frac{sum\ of\ all\ values}{number\ of\ values}$

The table provides a comparative overview of two phases in the project, namely "Learning Tool for Kids on Android Platform" (referred to as Project Title 1) and "PLAY AND LEARN" .The metrics include the total number of children engaged with the learning tool, the visual design's attractiveness score, and the average metric, which signifies an overall performance measure. Initially, Project Title 1 had 52 children, a visual design attractiveness score of 30, and an average of 0.58. In the current state, under Project Title 2, the number of children increased to 73, the visual design score improved significantly to 73, and the average metric increased to 1. This suggests positive progress and enhancement in both user engagement and visual design appeal within the scope of the project.

2.5 Summary

The context of two distinct educational initiatives, the first involving three projects Design for Game-based Learning Application: An Effective Integration of Technology to Support

Learning [5], An Exploratory study of Mobile-Based Scenarious for Foreign Language Teaching In Early Childhood [31], and PLAY AND LEARN, focused on enhancing children's understanding. Across the projects, varying levels of initial comprehension were measured through pretest scores, with PLAY AND LEARN showing the highest average pretest score of 0.79. Following intervention, posttest scores increased, with PLAY AND LEARN demonstrating the most substantial improvement, boasting an average posttest score of 0.93. This suggests significant progress in participant comprehension during the learning activities.Shifting to a different evaluation, the second set of projects specifically "Learning Tool for Kids on Android Platform" and "PLAY AND LEARN" centered on visual design and interface attractiveness. In this context, PLAY AND LEARN received a perfect average attractiveness score of 1, signifying unanimous approval from all 73 participating children. Meanwhile, the Learning Tool for Kids on Android Platform had 30 out of 52 children finding the visual design and interface attractive, resulting in an average attractiveness score of 0.58. This indicates a favorable response and engagement, albeit not universal, showcasing the varying degrees of appeal in the visual design and interface of these educational projects.

CHAPTER 3

METHODOLOGY

3.1   Introduction

This project aims to create and build a mobile application that is both enjoyable for children and serves as an educational tool, facilitating learning across various subjects such as the alphabet, numbers, shapes, and interactive quizzes.This section describes the methodical process used to make sure the e-learning application is effective, interactive, and appropriate for its target audience. The process for creating the mobile e-learning application included a number of crucial elements. In order to gather knowledge about the best practices and pedagogical principles for creating educational applications for kids, a thorough assessment of the literature and educational materials already available was first carried out. The subsequent design and development procedures were built around the findings of this literature review. The conceptualization and planning stage, which includes defining the application's scope, objectives, target audience, and learning outcomes, was the next step for the research team. Based on these factors, the necessary educational material including quizzes, the alphabet, numbers, and shapes was compiled into a systematic curriculum. Following the literature review, the research team embarked on the conceptualization and planning stage of the mobile e-learning application. This stage involved defining the scope, objectives, target audience, and desired learning outcomes of the application. The team carefully considered the age range and developmental needs of the target audience, ensuring that the content and design of the application are suitable for kids. Once the scope and objectives were established, the team proceeded with the compilation of educational material

65

for the application's curriculum. This included developing content related to various topics such as the alphabet, numbers, shapes, and quizzes. The educational material was designed to be engaging, interactive, and aligned with the learning goals identified during the planning stage.The development of the mobile application involved utilizing the findings from the literature review to inform the design and implementation process. The research team focused on incorporating efficient instructional strategies and best practices into the application's features and functionalities. This included interactive elements, visual aids, and age-appropriate content to enhance the learning experience.Throughout the development process, the research team prioritized user-centered design principles to ensure that the application is intuitive and easy to use for young learners. Usability testing and feedback from children and their parents or guardians were sought to refine the application's user interface and overall usability.The methodology also included iterative cycles of development, testing, and refinement. The research team continuously evaluated the application's effectiveness, making necessary adjustments and improvements based on user feedback and observed learning outcomes. In summary, the methodology for designing and developing the mobile e-learning application involved a thorough literature review, followed by a careful conceptualization and planning stage. The educational material was curated based on the identified learning goals, and user-centered design principles were applied throughout the development process. The iterative nature of the methodology ensured that the application's effectiveness and user experience were continually assessed and enhanced.

3.2 Sustainable Development

In the modern world, social impact and sustainable development are key considerations in technology development. Several steps are taken in the context of my mobile learning application, "PLAY AND LEARN," to ensure sustainable development and satisfy future

needs. The application's user-friendly interface, which guarantees excellent accessibility and safety, is the first thing to note. Additionally, the application's instructional material encourages environmental sustainability and increases children's knowledge of the value of environmental conservation.The "PLAY AND LEARN" program also encourages lifelong learning by providing a variety of learning modules that may be updated and enhanced regularly. As a result, kids can gradually pick up new knowledge and abilities. The application also makes use of sustainable technology by conserving resources, consuming less battery, and extending battery life on mobile devices.By incorporating sustainable practices into the creation and use of the mobile learning application "PLAY AND LEARN," we can support the overarching objective of sustainable development by promoting environmental awareness, lifelong learning, and reducing the environmental impact of technology.

3.3 Development of system project

The waterfall model serves as a sequential approach for developing an e-learning mobile application tailored for kids. This method progresses through distinct phases, including requirements gathering, system design, implementation, and testing. The initial step involves identifying application requirements by understanding the target audience and their educational needs. The system design phase focuses on crafting a user-friendly interface and establishing technical specifications. During implementation, the application is developed with interactive elements and educational content. Finally, rigorous testing is conducted to verify proper functionality and alignment with specified requirements. The waterfall model offers a methodical and organized framework for creating a systematic e-learning mobile application for kids.
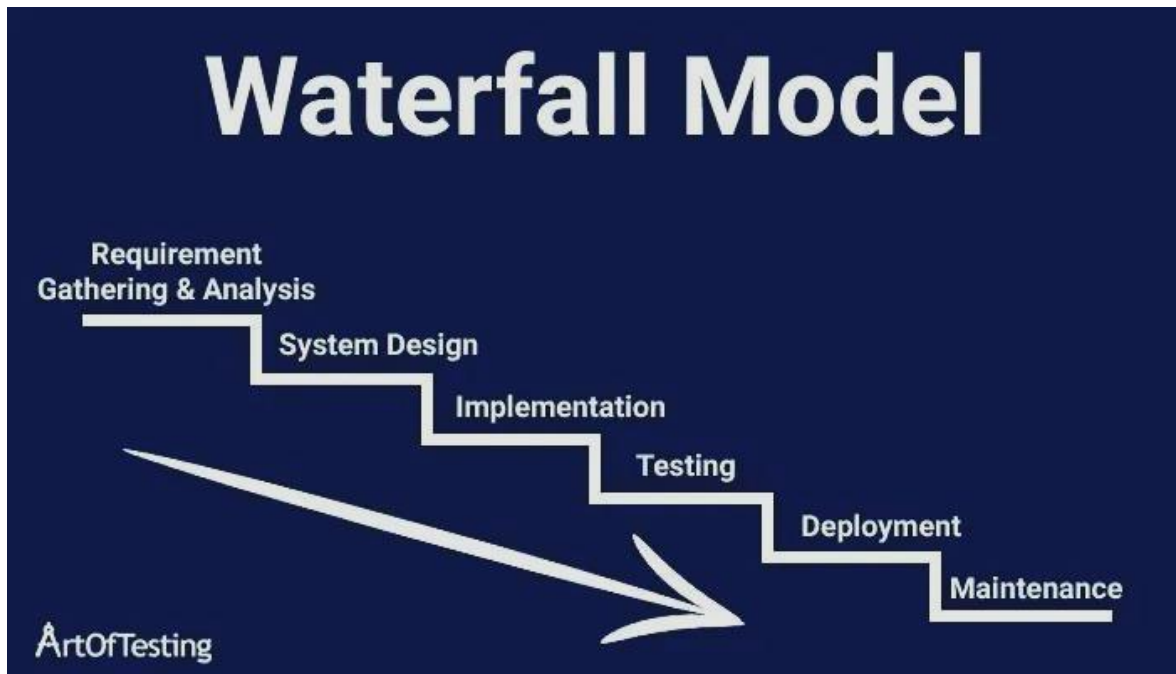
Figure 3.10 Waterfall Model

3.3.1 Requirement Analysis

When developing an e-learning mobile application for kids, it is essential to consider several requirements to ensure an effective and engaging learning experience. The application should offer age-appropriate educational content that considers the cognitive abilities and developmental stages of the target age group. It should feature an interactive and visually appealing design, utilizing vibrant colors, animations, and intuitive user interfaces to capture the attention and interest of kids. Integration of multimedia elements, such as images, videos, audio, and interactive games, enhances the learning experience and makes it more engaging. The content and activities should align with relevant educational curricula or learning objectives, providing educational value and coherence. Progress tracking and assessment features, including quizzes, assessments, and progress reports, allow for monitoring a child's learning achievements and identifying areas for improvement. Personalization is important, allowing the application to adapt to each child's individual needs and learning pace through

features like adaptive learning algorithms or customizable learning paths. Offline access ensures that kids can continue learning even without an internet connection. The application should provide features for parental involvement, including progress monitoring, communication channels, and access to supplementary resources. A user-friendly interface, with clear instructions and minimal text, enables kids to navigate the application independently. Lastly, data security and privacy measures should be implemented to protect the personal information of the users, especially when dealing with children's data.

3.3.2   System Design

This section covers the process of system development. A flow chart is constructed to have a better look of understanding of the flow of the system. This system is developed to solve the difficulty of pre-schools kids learn about alphabet, numbers, and shapes. Also, this application provides some quizzes for the kids to understand more about alphabet, numbers, and shapes. In the system design phase, the research team focused on developing a comprehensive and user-friendly application that addresses the specific learning needs of preschool kids. A flow chart was constructed to visualize the flow of the system, providing a clear understanding of how different components and functionalities interact with each other. The primary objective of the system design was to create an intuitive and engaging learning experience for children. The application was designed to assist kids in learning about the alphabet, numbers, and shapes, which are fundamental concepts in early education. The research team ensured that the content related to these topics was age-appropriate, visually appealing, and presented in an interactive manner to capture the attention and interest of young learners. The system was designed to incorporate various features to

69

support the learning process. For example, interactive lessons on the alphabet, numbers, and shapes were developed, allowing kids to explore and interact with the content. The application provided visual representations of letters, numbers, and shapes, along with audio cues to enhance understanding and retention. In addition to the lessons, the application included quizzes to reinforce the learning objectives. These quizzes tested the children's knowledge and understanding of the alphabet, numbers, and shapes, providing a fun and interactive way to assess their progress. Feedback and rewards were incorporated into the quizzes to motivate and encourage kids to continue learning. To ensure a user-friendly experience, the system design incorporated intuitive navigation and a visually appealing interface. The application's design elements, such as colors, fonts, and graphics, were carefully selected to create a visually stimulating environment that engages and captivates the young learners. Furthermore, the system design considered the technical requirements and limitations of mobile devices. The application was optimized to run smoothly on smartphones and tablets, taking into account factors such as screen size, touch input, and device compatibility. Overall, the system design phase focused on creating an effective and interactive learning environment for preschool kids. The flow chart provided a visual representation of the system's functionalities and interactions, guiding the development process. By incorporating engaging content, interactive lessons, quizzes, and a user-friendly interface, the research team aimed to provide an enjoyable and effective learning experience for young learners.

3.4 Implementation

In the implementation phase, the research team focused on turning the design concepts into a functional mobile application. This involved several key steps, including identifying the hardware and software requirements, selecting an appropriate development framework, and
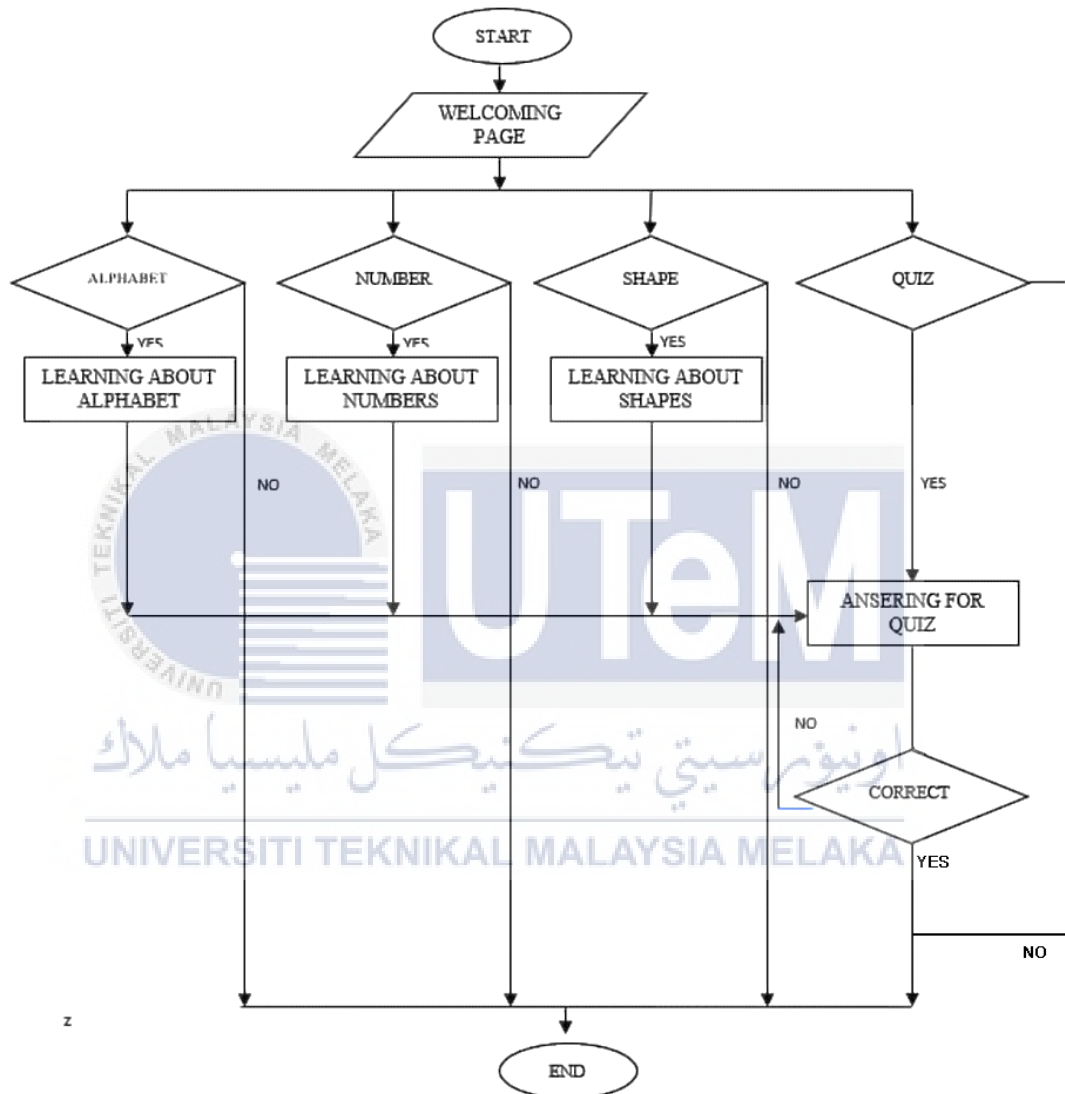

Figure 3.11 Flowchart

testing the code for debugging and improvement. the hardware and software requirements for the application were identified. This included determining the minimum specifications for the target devices, such as smartphones and tablets, to ensure optimal performance. Additionally, the required software dependencies and libraries were identified to support the development process. Next, a suitable development framework was selected based on the project requirements and team expertise. The chosen framework provided a set of tools and resources to streamline the development process and facilitate the creation of a robust and efficient application. Once the development framework was chosen, the research team started writing the code for the application. This involved implementing the various features and functionalities outlined in the system design phase. The code was written using programming languages and technologies supported by the chosen framework, ensuring compatibility and seamless integration. Throughout the implementation process, thorough testing was conducted to identify and resolve any issues or bugs in the code. This included unit testing, where individual components of the application were tested for functionality and correctness. Additionally, integration testing was performed to ensure that different parts of the application worked together smoothly. Testing also involved user feedback and evaluation to gather insights and identify areas for improvement. This feedback helped in refining the application's user interface, functionality, and overall user experience. During the implementation phase, the research team also documented the code, creating clear and concise documentation to aid in future maintenance and updates of the application.

Overall, the implementation phase involved translating the design concepts into a functional mobile application by identifying hardware and software requirements, selecting a development framework, writing code, and conducting thorough testing. This process

72

ensured that the application was developed to meet the specified requirements and delivered a seamless and engaging learning experience for preschool kids.

3.4.1 Hardware Requirement

Table 2-6 Hardware Used in Application Development and Testing

Hardware	Description
Laptop	Used to develop the application
Android Phone	Used to run and test the application

The laptop was utilized as the development environment where the research team wrote and compiled the application code. It provided the necessary computing power and resources to support the development process. The Android phone was used as a testing device to ensure that the application functioned correctly on an actual mobile device. It allowed the research team to run the application, simulate user interactions, and identify any potential issues or bugs. Both the laptop and Android phone played crucial roles in the implementation phase, enabling the research team to create and test the mobile application effectively.

3.4.2 Software Requirement

The system is built with 2 tools which are Adobe Animate and Adobe Photoshop. The e-learning system is developed using Adobe Animate and Adobe Photoshop. Adobe Animate is used for creating interactive and animated content, while Adobe Photoshop is used for designing visually appealing graphics and images.

3.4.2.1 Adobe Animate

Adobe Animate is a multimedia software platform that enables the creation of interactive and animated content. It provides a powerful environment for developing rich media experiences, including games, simulations, and interactive presentations. In the context of e-learning, Adobe Animate can be used to create engaging educational content with interactive elements, such as quizzes, animations, and multimedia resources.

3.4.2.2 Adobe Photoshop

Adobe Photoshop is a popular graphics editing software used for creating and manipulating images and graphics. In the context of e-learning, Adobe Photoshop can be used to design visually appealing learning materials, such as illustrations, infographics, diagrams, and user interfaces. It offers a wide range of tools and features for image editing, including photo retouching, color correction, and graphic design. By using Adobe Photoshop, the e-learning system can ensure high-quality visuals and enhance the overall aesthetic appeal of the learning materials.

3.5   Summary

This chapter delves into the "Play & Learn" Android application's development process, providing a thorough examination of the system's implementation to meet project criteria and achieve its intended goal. Extensive information include development approaches used, project implementation tactics, and a project flowchart overview. The principal objective is to carefully examine and identify the tools and frameworks that are thought to be relevant and appropriate for the particular requirements of the project. By ensuring that the chosen technologies successfully support the required functionalities, this strategic evaluation clears the path for the successful development of an impactful and user-friendly application. Now

that the project has been finished, this chapter presents the learnings discovered during the course of development.

CHAPTER 4

RESULTS AND DISCUSSIONS

4.1   Introduction

This chapter presents the results of the development of the "PLAY AND LEARN" e-learning mobile application. we delve into the results and discussions arising from the development and implementation of the mobile application "PLAY&LEARN" designed specifically for children aged 3 to 6. This educational app focuses on cultivating foundational knowledge in alphabet, numbers, and shapes, integrating interactive quizzes for an engaging learning experience. The aim of this chapter is to provide a comprehensive overview of the outcomes derived from user interactions and assessments within the application. Through an exploration of the gathered results, we aim to illuminate the effectiveness and impact of "PLAY&LEARN" in achieving its educational objectives. The ensuing discussion will delve into key insights, potential improvements, and the overall significance of the findings in the context of early childhood education. This chapter serves as a critical examination of the app's performance and user engagement, shedding light on its efficacy as a valuable learning tool for young children.

4.2   Results and Analysis

4.2.1   Front Page Layout

The front page of the application welcomes users with a warm and inviting message, setting the tone for an engaging learning experience. It serves as the initial point of contact and

creates a positive first impression. The welcoming message may express enthusiasm for

learning, encourage exploration, and convey the application's purpose and value. Alongside

the message, a prominent button labeled "Start" is displayed, inviting users to enter and begin

their e-learning journey. This button acts as a gateway, signaling the transition from the front

page to the main content of the application. Its clear label and visually appealing design

attract users' attention and encourage them to take the next step. Overall, the front page

creates an inviting and user-friendly interface, enticing users to explore the application and

dive into the educational content it offers.

Figure 3.12 Front page

4.2.2 Main Menu Page Layout

The main menu page layout of the "PLAY AND LEARN" e-learning mobile application

features four selection buttons that provide access to different learning modules. These

modules include alphabet, numbers, shapes, and quizzes, catering to various educational aspects for the users. The layout is designed to be visually appealing and user-friendly, ensuring ease of navigation and engagement. Each selection button is prominently displayed with a clear icon or label, representing its corresponding learning module. This visual representation helps users quickly identify and choose the area of study they want to explore. The alphabet selection button directs users to a section where they can learn about letters and their sounds, allowing them to develop their literacy skills. The numbers selection button leads to a module dedicated to teaching numbers. The shapes selection button takes users to an interactive section where they can discover different shapes and their properties. Lastly, the quiz selection button offers an engaging way for users to test their knowledge and reinforce their learning through interactive quizzes. The main menu page layout ensures that these four essential areas of learning are easily accessible and distinguishable. By providing clear and intuitive buttons, users can navigate the application with ease and choose the specific learning module that aligns with their educational goals. The layout promotes a well-structured and organized approach to e-learning, enhancing the overall user experience and encouraging active participation in the educational content provided by the application.in the menu page also have exit button to quit the application.

Figure 3.13 Menu page

4.2.3 Alphabet Page Layout

The Alphabet Page Layout in the "PLAY AND LEARN" e-learning mobile application is designed to help users learn and familiarize themselves with the alphabet. The layout focuses on one specific letter at a time, providing interactive elements to enhance the learning experience. At the center of the page, the letter is prominently displayed, such as the letter "A." Below the letter, there is a sentence that exemplifies the letter. In this case, it would be "A for Apple." This sentence serves as a visual and contextual reference to reinforce the association between the letter and a corresponding word. To engage users further, a speaker button is provided. When users click on the speaker button, a voice-over is activated, pronouncing the letter and the corresponding word. This audio element adds a multisensory aspect to the learning process, aiding in auditory recognition and pronunciation. Located at the bottom of the layout, there are three buttons: "Next," "Previous," and "Home." The "Next" button allows users to proceed to the next letter in the alphabet sequence, providing

79

a sense of progression in the learning journey. The "Previous" button enables users to go back to the previous letter if they wish to review or revisit a specific letter. The "Home" button allows users to return to the main menu page, providing easy access to other learning modules and activities within the application.The Alphabet Page Layout ensures a focused and interactive learning experience for each letter of the alphabet. By combining visual representation, contextual sentences, audio pronunciation, and intuitive navigation buttons, users can actively engage with the alphabet content and reinforce their understanding and recognition of letters and associated words.

Figure 3.14 Alphabet learning page

4.2.4   Numbers Page Layout

The Numbers Page Layout in the "PLAY AND LEARN" e-learning mobile application is designed to introduce users to numbers and their corresponding words. Similar to the Alphabet Page Layout, the Numbers Layout focuses on one number at a time to facilitate learning and comprehension. At the center of the page, the number is prominently displayed, such as the number "1." Below the number, the corresponding word is written. In this case, it would be "ONE." This word serves as a visual representation and reinforces the association between the number and its written form. To enhance the learning experience, a speaker button is provided. When users click on the speaker button, a voice-over pronounces the word associated with the number. In this case, it would pronounce "ONE." This auditory element allows users to hear the correct pronunciation, aiding in their understanding and recognition of numbers and their corresponding words. Similar to other pages, the Numbers Page Layout also includes navigation buttons at the bottom. The "Next" button allows users to proceed to the next number in the sequence, providing a sense of progression in the learning process. The "Previous" button permits users to revisit the preceding number for review or to strengthen their comprehension. Meanwhile, the "Home" button facilitates a return to the main menu page, offering convenient access to other learning modules within the application.The Numbers Page Layout provides an interactive and engaging platform for users to learn and familiarize themselves with numbers and their corresponding words. By combining visual representation, audio pronunciation, and intuitive navigation buttons, users can actively engage with the numbers content, reinforce their understanding, and develop numerical literacy skills.

81
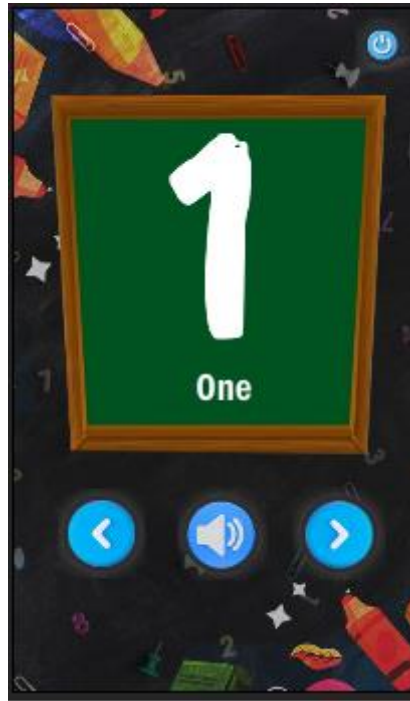
Figure 3.15 Number learning page

4.2.5 Shapes Page Layout

The Shapes Page Layout in the "PLAY AND LEARN" e-learning mobile application is designed to introduce users to different shapes and their corresponding names. It follows a similar format to the previous pages, presenting one shape at a time to facilitate learning and recognition. At the centre of the page, a visual representation of the shape is displayed, such as a circle. Below the shape, the name of the shape is written, in this case, "CIRCLE." This labelling reinforces the association between the visual representation and the name of the shape, aiding in shape recognition and vocabulary development. To enhance the learning experience, a speaker button is provided. By clicking on the speaker button, users can listen to a voice-over pronouncing the name of the shape. In this case, it would pronounce "CIRCLE." This auditory element helps users to hear the correct pronunciation of the shape's name, further reinforcing their understanding and familiarity with different shapes. Like the previous layouts, the Shapes Page Layout also includes navigation buttons at the bottom.

The "Next" button allows users to move to the next shape in the sequence, allowing for a sense of progression in the learning process. The "Previous" button enables users to go back to the previous shape for review or reinforcement. The "Home" button provides a quick way to return to the main menu page. The Shapes Page Layout offers an interactive and engaging platform for users to learn and identify various shapes. By combining visual representation, audio pronunciation, and intuitive navigation, users can actively engage with the shapes content, reinforce their understanding, and develop shape recognition skills.

Figure 3.16 Shapes learning page

4.2.6   Quiz Page Layout

The design of the quiz layout within the "PLAY AND LEARN" mobile e-learning application aims to evaluate users' knowledge and comprehension through interactive quizzes. Positioned at the center of the page is a speaker button, surrounded by multiple answer options. When activated, the speaker button vocalizes the question or prompt to the user, enhancing the learning process and aiding users in making informed choices.The

answer choices are strategically placed around the speaker button, allowing users to select their responses by tapping the corresponding option. Upon choosing the correct answer, the application smoothly transitions to a "Correct Answer" page, delivering positive feedback to reinforce the user's understanding. In the event of an incorrect selection, the application redirects to an "Oops, Try Again" page. This page communicates that the chosen answer was incorrect, motivating users to reconsider their response and make an alternative selection. It serves as a valuable opportunity for learning from mistakes and improving overall understanding.Located at the bottom of the quiz layout are navigation buttons, including the home, next, and previous buttons. The home button facilitates a return to the main menu page, while the next and previous buttons allow seamless navigation between different quiz questions. These navigation features provide users with convenience and flexibility in exploring the quiz content. In summary, the quiz layout integrates interactive elements, auditory prompts, and feedback mechanisms to create a captivating and effective learning experience for users within the "PLAY AND LEARN" e-learning mobile application.

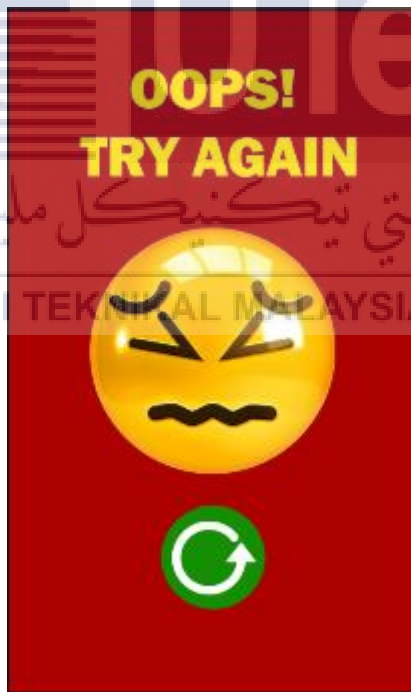*Figure 3.17 quiz page layout*

Figure 3.18 Correct page layout

Figure 3.19 Wrong page layout

4.2.7   Quit Lesson Button

The "Quit" button serves as a prominent and user-friendly feature across all pages of the "PLAY AND LEARN" e-learning mobile application. With a simple click, this button enables users to effortlessly return to the main menu, offering a convenient and intuitive method to exit different sections of the application. The primary purpose of the "Quit" button remains to offer users flexibility and control over their learning experience. By redirecting users to the main menu upon clicking the "Quit" button, we enhance the app's usability. This modification ensures that users are guided back to the starting point of the application, facilitating an effortless transition between different learning modules or activities. However, it's crucial to implement a confirmation message or dialog box to verify users' intentions before exiting the application. This additional step prevents accidental clicks and guarantees a deliberate decision to quit. The incorporation of the "Quit" button with the revised functionality aligns with our commitment to providing a seamless and user-centric experience. Users can now easily return to the main menu from any section of the app, fostering a more intuitive and accessible learning environment.


Figure 3.20 Quit lesson button

4.2.8   Exit Button

The "Exit" button serves as a prominent and user-friendly feature across all pages of the "PLAY AND LEARN" e-learning mobile application. This button allows users to smoothly

close the app with a simple click, providing a convenient and intuitive way to exit various sections of the app. The primary purpose of the "Exit" button remains to offer users flexibility and control over ending their learning session. Upon clicking the "Exit" button, a pop-up will appear, asking users, "Do you want to exit the app?" The pop-up will feature two buttons, "Yes" and "No." If users click "Yes," the app will be closed. If users click "No," the pop-up will disappear, allowing users to continue their interaction with the application. This implementation enhances the app's usability, ensuring that users can efficiently conclude their session while preventing accidental exits. The incorporation of the "Exit" button with the confirmation pop-up aligns with our commitment to providing a seamless and user-centric experience. Users can now easily close the app from any section, fostering a more intuitive and accessible learning environment.
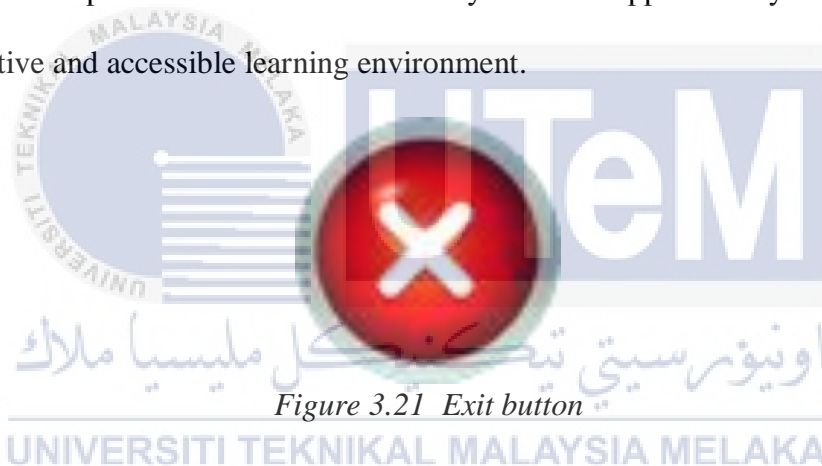
Figure 3.21 Exit button

Figure 3.22 POP up Message

4.2.9 Survey

The visual design and interface of the "Play and Learn" app are engaging and attractive.
3 responses

● Strongly Disagree
● Disagree
● Neutral
● Agree
● Strongly Agree

100%
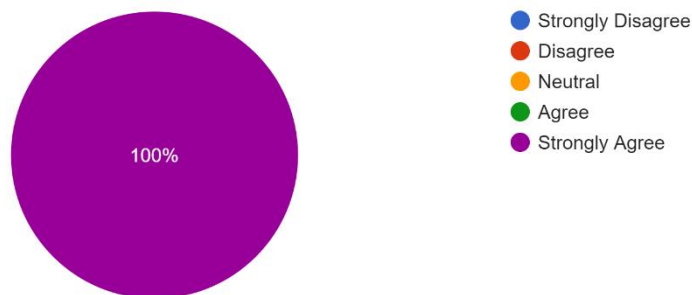
Figure 3.23 The "Play and Learn" app features an engaging and attractive interface

All 73 surveyed students unanimously and emphatically agree, representing 100% consensus, that the visual design and interface of the 'Play and Learn' app are not only engaging and attractive but also underscore a high level of overall engagement. This resounding endorsement, with every participant expressing strong agreement, solidifies the app's success in captivating its young audience. Achieving a full 100% approval rate underscores the app's effectiveness, showcasing a harmonious blend of appealing design and captivating content. These survey results highlight the app's ability to provide a universally immersive and engaging learning experience for all participants.
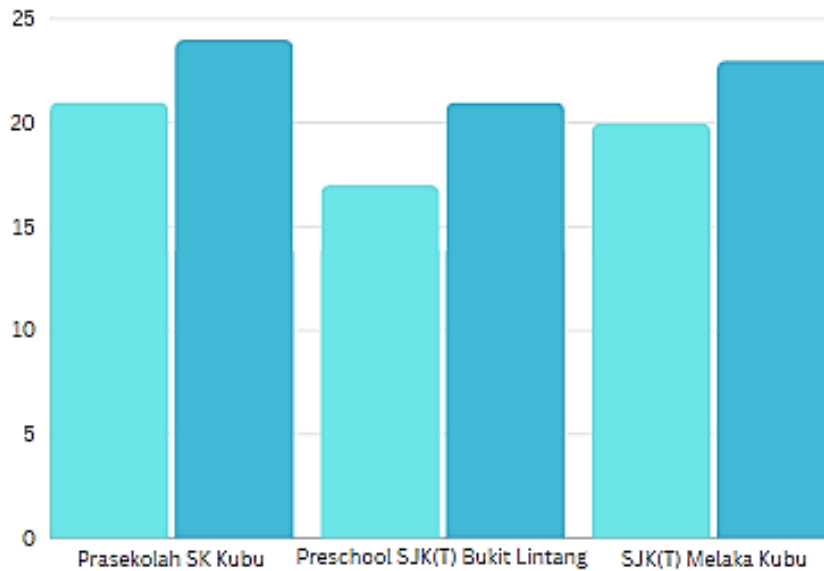
Figure 3.24 Pretest and Posttest results

The pretest results conducted before the utilization of the PLAY AND LEARN app revealed promising outcomes across three participating institutions. At Prasekolah SK Kubu, 21 students achieved perfect scores, followed by Preschool SJK(T) Bukit Lintang with 17 students and SJK(T) Melaka Kubu with 20 students, all exhibiting full correctness in their assessments. After the implementation of the PLAY AND LEARN app, a noteworthy improvement was observed in the posttest results. Prasekolah SK Kubu saw an increase to 24 students with full correct answers, Preschool SJK(T) Bukit Lintang advanced to 21 students, and SJK(T) Melaka Kubu rose to 23 students. These posttest outcomes suggest a positive impact of the PLAY AND LEARN app on student performance, with evident progress in knowledge retention and understanding across the assessed institutions.

4.3   Summary

Chapter 4 offers a comprehensive overview of the results and discussions stemming from the development of the "PLAY AND LEARN" e-learning mobile application. It thoroughly

89

examines the layout and features of key pages such as the front page, main menu page, alphabet page, numbers page, shapes page, quiz page, and the incorporation of a "Quit" button. This chapter elucidates the current user experience and functionality of the application, presenting in-depth insights into design elements and functionality for each page. Notable aspects include options for seamless navigation between different sections, the integration of audio pronunciations, and the establishment of feedback mechanisms for both correct and incorrect answers within the quiz section. By shedding light on these current features and functionalities, the chapter contributes to a deeper understanding of how the "PLAY AND LEARN" application engages users in interactive learning activities while upholding a user-friendly interface. As a result, this chapter forms the foundation for the ongoing evaluation of the application's effectiveness and usability.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

In conclusion, the "PLAY AND LEARN" mobile application stands as a forward-thinking and comprehensive solution to meet the educational needs of children in the digital age. Operating on the Android platform, the app capitalizes on technology to provide an immersive and interactive learning experience. Through the integration of multimedia elements such as music, animation, and dynamic visuals, the application aims to capture children's attention and foster cognitive development. Its emphasis on teaching numbers, the alphabet, shapes, and interactive quizzes contributes to a well-rounded educational experience. This approach nurtures early literacy and numeracy skills, stimulates problem-solving abilities, and cultivates a love for learning. The incorporation of electronic media introduces children to the concept of learning through technology, ensuring an engaging experience. The "PLAY AND LEARN" app recognizes the significance of sensory learning and utilizes children's innate curiosity to learn through their senses. By creating a stimulating and enjoyable learning environment, the app supports the development of motor skills, hand-eye coordination, and critical thinking. Additionally, its user-friendly interface and accessibility via Android smartphones make it convenient for children to access educational content anytime, anywhere. Looking towards the future, the "PLAY AND LEARN" mobile application has plans for enhancements. This includes the introduction of features such as shuffling quizzes, incorporation of math calculations, addition of more captivating quizzes, and the expansion of learning materials tailored for children aged 3 to 6. These planned updates further signify the application's commitment to continuous improvement and

91

adapting to the evolving landscape of educational technology. As technology continues to shape the educational landscape, "PLAY AND LEARN" positions itself as a valuable tool, empowering children and fostering a passion for lifelong learning.

5.2   Potential for Commercialization

The "PLAY AND LEARN" application has significant commercial potential in the educational technology market. Addressing a gap in Android apps for children's learning, it offers a comprehensive platform covering letters, numbers, shapes, and interactive quizzes. Its incorporation of multimedia features aligns with the latest trends in enhancing children's learning experiences. The app's potential to contribute to cognitive development, motor skills, and problem-solving positions it as a valuable tool for parents and educators. Combining education with entertainment, "PLAY AND LEARN" transforms learning into a fun and interactive experience, making it an attractive choice for families and educational institutions seeking innovative educational solutions for young learners.

5.3   Future Works

    I.   Content Expansion : Keep adding new lessons, quizzes, and interactive features to cover a wider age range and diverse learning needs.

    II.   Adaptive Learning : Use smart technology to personalize the educational experience based on each child's progress and preferences.

    III.   Parental Engagement Features : Create features for parents to track their child's progress, set learning goals, and receive insights through a dedicated app or website.

IV.   Accessibility Features : Ensure inclusivity by implementing features like voice commands, larger text options, and audio descriptions for children with special needs.

V.   Gamification Elements : Introduce reward systems, badges, and virtual incentives to add motivation and make the learning experience more engaging.

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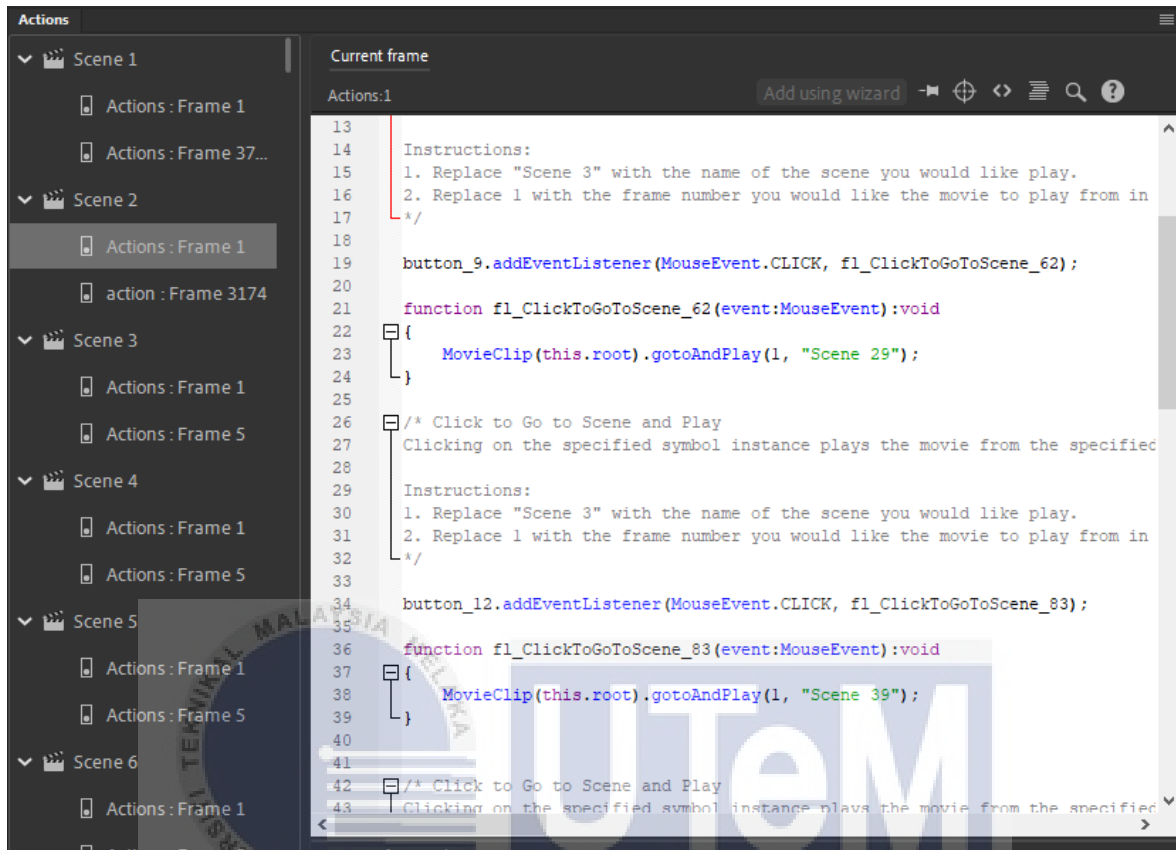
Appendix A   Project Planning PSM 1

Project Activity	Week													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
PSM briefing Title selection for project Simple report and proposal	■	■												
Chapter 1 Introduction		■	■	■										
Chapter 2 Literature review				■	■	■	■	■	■	■				
Progress Work 1 Evaluation														
Chapter 3 Methodology								■	■	■				
Chapter 4 expected result											■	■		
Progress Work 2 Evaluation												■		
Chapter 5 conclusion												■		
Submission													■	
Presentation														■

Appendix B   Project Planning PSM 2

Project Activity	Week													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Designing Interface	■	■	■	■	■	■	■	■						
Adobe Animate action script for welcoming,main menu, and alphabet page		■	■	■										
Voice record for implemation			■	■	■	■								
Progress Work 1 Evaluation						■								
Adobe Animate action script for numbers and shapes pages						■	■	■	■					
Adobe Animate action script for quiz pages									■	■	■	■		
Progress Work 2 Evaluation											■	■		
Chapter 5 conclusion												■		
Submission													■	
Presentation														■
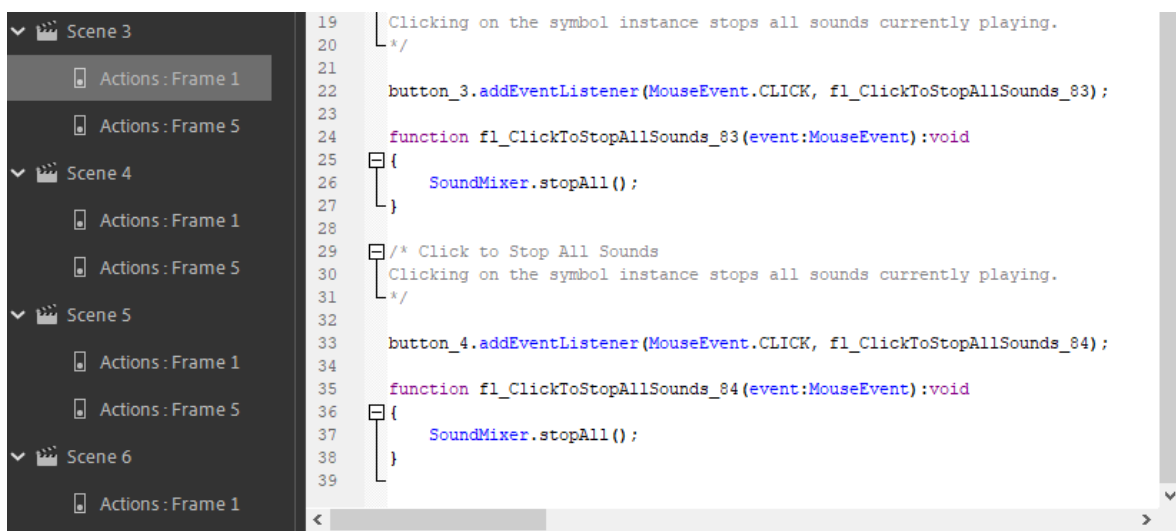
Appendix C   Scene Navigator code


```
13
14      Instructions:
15      1. Replace "Scene 3" with the name of the scene you would like play.
16      2. Replace 1 with the frame number you would like the movie to play from in
17    */
18
19      button_9.addEventListener(MouseEvent.CLICK, fl_ClickToGoToScene_62);
20
21      function fl_ClickToGoToScene_62(event:MouseEvent):void
22    {
23          MovieClip(this.root).gotoAndPlay(1, "Scene 29");
24    }
25
26    /* Click to Go to Scene and Play
27      Clicking on the specified symbol instance plays the movie from the specified
28
29      Instructions:
30      1. Replace "Scene 3" with the name of the scene you would like play.
31      2. Replace 1 with the frame number you would like the movie to play from in
32    */
33
34      button_12.addEventListener(MouseEvent.CLICK, fl_ClickToGoToScene_83);
35
36      function fl_ClickToGoToScene_83(event:MouseEvent):void
37    {
38          MovieClip(this.root).gotoAndPlay(1, "Scene 39");
39    }
40
41
42    /* Click to Go to Scene and Play
43      Clicking on the specified symbol instance plays the movie from the specified
```

Appendix D   stop all sound code


```
19      Clicking on the symbol instance stops all sounds currently playing.
20    */
21
22      button_3.addEventListener(MouseEvent.CLICK, fl_ClickToStopAllSounds_83);
23
24      function fl_ClickToStopAllSounds_83(event:MouseEvent):void
25    {
26          SoundMixer.stopAll();
27    }
28
29    /* Click to Stop All Sounds
30      Clicking on the symbol instance stops all sounds currently playing.
31    */
32
33      button_4.addEventListener(MouseEvent.CLICK, fl_ClickToStopAllSounds_84);
34
35      function fl_ClickToStopAllSounds_84(event:MouseEvent):void
36    {
37          SoundMixer.stopAll();
38    }
39
```
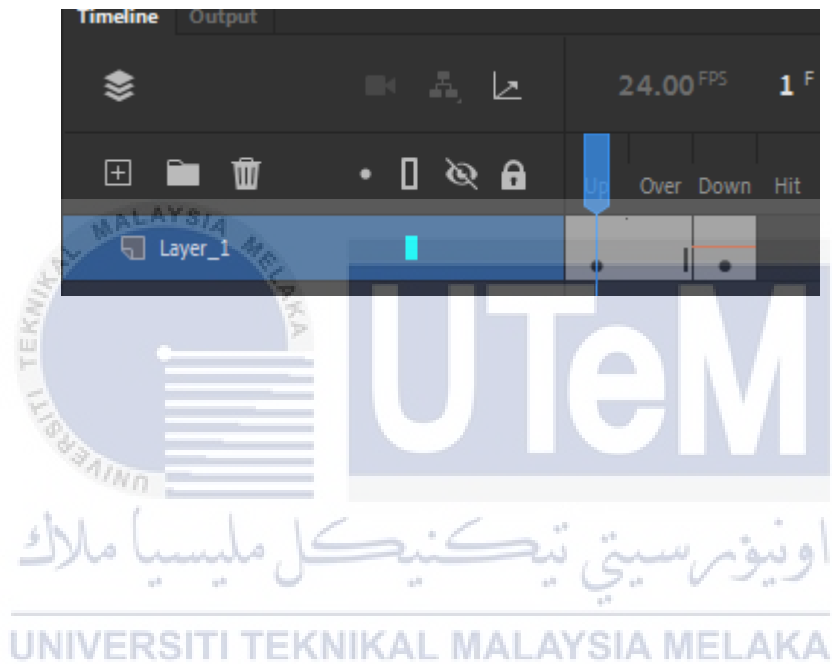
Appendix E   scene stop code

Appendix F   sound button keyframe

103

PLAY AND LEARN APP SURVEY

PERSONAL INFORMATION:

INSTITUTE NAME:

Prasekolah Khalifah , Sek. keb kubu

NO OF STUDENTS

25

AGE RANGE :   3☐ 4☐ 5☐ 6☑

ADDRESS: Jalan kampung Ampat, 75300 kubu, melaka

INSTRUCTIONS:

Dear teachers, kindly observe the kindergarten students as they engage with the Play and Learn mobile application, and subsequently, please complete the provided survey to share your valuable insights and observations regarding their usage and learning experiences.

QUESTIONS:

RATING SCALE:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The visual design and interface of the "Play and Learn" app are engaging and attractive.					✓
The app effectively captures and maintains the attention of children while learning alphabets, numbers, and shapes.					✓
The app successfully strikes a balance between educational content and entertaining elements for children.					✓
I am likely to recommend the "Play and Learn" app to other parents or educators for early childhood education.					✓
The navigation within the app is intuitive and user-friendly for both children and teachers.					✓
The "Play and Learn" app has positively influenced my students's understanding of alphabets, numbers, and shapes.					✓
I have clear ideas for additional features or improvements that would enhance the learning experience in future updates of the "Play and Learn" app.					✓

Before using the "Play and Learn" app, please describe the typical level of scores your students achieved in alphabet, numbers, and shapes assessments.

No of students :

21

After using the "Play and Learn" app, please describe any noticeable changes in your students' scores in alphabet, numbers, and shapes assessments.

No of students :

24

104

PLAY AND LEARN APP SURVEY

PERSONAL INFORMATION:

INSTITUTE NAME:

PRESCHOOL   SJK (T) BUKIT LINTANG

NO OF STUDENTS
23

AGE RANGE :   3 ☐ 4 ☐ 5 ☑ 6 ☑

ADDRESS:

INSTRUCTIONS:

Dear teachers, kindly observe the kindergarten students as they engage with the Play and Learn mobile application, and subsequently, please complete the provided survey to share your valuable insights and observations regarding their usage and learning experiences.

QUESTIONS:

RATING SCALE:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The visual design and interface of the "Play and Learn" app are engaging and attractive.					✓
The app effectively captures and maintains the attention of children while learning alphabets, numbers, and shapes.					✓
The app successfully strikes a balance between educational content and entertaining elements for children.					✓
I am likely to recommend the "Play and Learn" app to other parents or educators for early childhood education.					✓
The navigation within the app is intuitive and user-friendly for both children and teachers.					✓
The "Play and Learn" app has positively influenced my students's understanding of alphabets, numbers, and shapes.					✓
I have clear ideas for additional features or improvements that would enhance the learning experience in future updates of the "Play and Learn" app.					✓

Before using the "Play and Learn" app, please describe the typical level of scores your students achieved in alphabet, numbers, and shapes assessments.	No of students : 17
After using the "Play and Learn" app, please describe any noticeable changes in your students' scores in alphabet, numbers, and shapes assessments.	No of students : 21

PLAY AND LEARN APP SURVEY

PERSONAL INFORMATION:

INSTITUTE NAME:
SJK (T)   MELAKA   KUBU

NO OF STUDENTS
25

AGE RANGE :   3 ☐   4 ☐   5 [5]   6 [20]

ADDRESS: ────────────────

INSTRUCTIONS:

Dear teachers, kindly observe the kindergarten students as they engage with the Play and Learn mobile application, and subsequently, please complete the provided survey to share your valuable insights and observations regarding their usage and learning experiences.

QUESTIONS:

RATING SCALE:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The visual design and interface of the "Play and Learn" app are engaging and attractive.					✓
The app effectively captures and maintains the attention of children while learning alphabets, numbers, and shapes.					✓
The app successfully strikes a balance between educational content and entertaining elements for children.					✓
I am likely to recommend the "Play and Learn" app to other parents or educators for early childhood education.					✓
The navigation within the app is intuitive and user-friendly for both children and teachers.					✓
The "Play and Learn" app has positively influenced my students's understanding of alphabets, numbers, and shapes.					✓
I have clear ideas for additional features or improvements that would enhance the learning experience in future updates of the "Play and Learn" app.					✓

Before using the "Play and Learn" app, please describe the typical level of scores your students achieved in alphabet, numbers, and shapes assessments.

No of students :
20

After using the "Play and Learn" app, please describe any noticeable changes in your students' scores in alphabet, numbers, and shapes assessments.

No of students :
23

Appendix J   Prasekolah Khalifah,SK Keb Kubu App expalinantion

Appendix K   Prasekolah Khalifah,SK Keb Kubu App Obervation

Appendix M Prasekolah SJK(T) Kubu Melaka Observation