

Kids Educational and Entertainment Mobile Application

BY

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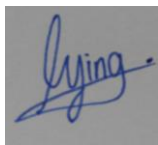
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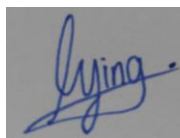
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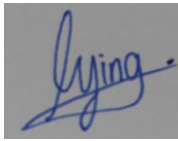


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ABSTRACT

In this project, the kids' educational and entertainment mobile application is developed to help kids between 3 to 6 years old learn English and Mathematics. This app can help them to learn more effectively and flexibly because it is not similar to traditional education which has the schedule and specific location needed. Besides, there are three problem statements which are lack of flexibility while learning in traditional education mode, lack of interactivity while learning in traditional education mode, and lack of progress report. For the first problem statement, the traditional education model is lack flexibility because children need to follow the schedule and need to go to school then only can learn knowledge. They need to follow the timetable planned by the school and are not able to choose the subject they want to learn at a specific time. Therefore, one of the objectives of this project is to help children to learn more flexibly. Children can use this learning app to learn without the need to follow the timetable and they can choose the subject they want to learn. Furthermore, the second problem is there is a lack of interactivity in traditional education. This is because traditional education focuses on theory-based lessons. There is less engagement for all children to participate in learning. Thus, to solve this problem, the project objective is to increase the interactivity level in learning. This mobile app can solve this problem by letting children learn in a more interactive way such as by letting them click the letter, word, and number. Then the app will provide the sound for them to teach them how to read it. Besides, children can click the answer for the quiz. Moreover, the third problem statement is lacking a progress report. Most of the existing systems lack progress reports. Parents are not able to know the quiz result and track the progress of learning of their children. So, this application will include a progress report to record the result and the lessons learned by the children. Parents can check the application progress report to know which subject or lessons their children are currently learning.

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Chapter 1

Introduction

In this era of globalization and modernization, the advancement of technology makes technology important in our daily lives [4]. With technology, the education sector also improved. With the help of technology, people can learn remotely at any time and any place by using the mobile application. Children can learn from the app to be well-prepared to study in school. Besides, children also can use the mobile learning app online to learn knowledge other than the lesson taught in school. Kids learning and entertainment application can provide help to parents in teaching their children because some parents, especially those who are in a lower socioeconomic background [8]. It can enhance the academics of children because it not only involved words in teaching them, but it also involves multimedia elements such as pictures and sound. This app also can let children learn according to their own pace. In addition, it also includes some entertainment things to make the learning session more interesting and attractive. This application can let children choose the subject they are interested in learning. The kids learning and entertainment application includes some quizzes for children to test them.

1.1 Problem Statement and Motivation

1.1.1 Problem Statement

- lack of flexibility while learning in traditional education mode

First and foremost, the first problem statement is that traditional education is lack flexibility. The traditional classroom has set a specific time for children to learn in school [1]. For example, children only go to school five days a week and the time spent in school is eight hours on average. Most schools follow this schedule [2]. Then, it makes children difficult to learn and it is not flexible for them. If they are absent for one day or more, they will not be able to catch up to the new lesson after going back to school [1]. As a result, it will affect their academic performance. If the children faced difficulties in their studies after school hours, they are not able to ask their teacher for solving the problem. So, traditional education is not flexible in learning. Besides, traditional education tends to teach children in class mode, which means that children are learning at the same pace. Therefore, this generalized learning mode is not effective and suitable for all children at the same time. In addition, it is also not able to personalize the learning topic in which they are more interested [2]. Besides, the school may not have the lessons that they are interested in their school.

- lack of interactivity while learning in traditional education mode

Furthermore, the second problem statement is that traditional education lack interactivity in teaching and learning. This is because traditional education focuses on theory-based lessons [3]. Most teachers teach the children to follow the textbook only. The children are learning by watching their textbooks. For example, traditional education involved the teacher standing in front of the class and teaching them through the whiteboard. Therefore, there is limited engagement for all the students to participate in learning interactively [2]. There is also less amount of quiz to test the understanding of the children or hands-on in the traditional class. Besides, traditional education is not included pictures, videos, or music all the time. So, it might affect the learning of children because they do not understand the meaning of the words. In addition, traditional interactivity is not allowed children to choose the lesson they want to learn and are not able to keep going back to the lesson the children do not understand. This is due to the reason that it will delay the lesson when teachers need to keep explaining the meaning to them. In traditional education, children are not able to click the textbook and get the sound of the word and they may need to ask the teacher about the pronunciation of the words. They are not staying in school 24 hours 7 days, they are not able to ask their teacher to solve their problem.

- lack of progress report

Most similar applications lack progress reports. Without the progress report, parents are not able to know the performance of their children in learning. Then, parents cannot track the learning progress of their children [5]. As a result, parents are not able to know the area in which their children are weak. Besides, parents are not able to monitor their child's activities. Therefore, they do not know the subject that their children need more improvement on and which topic is challenging for their children [6]. Nowadays, there are a lot of parents especially parents from lower socioeconomic backgrounds are not able to put all their effort to help their children's academic [7]. This is because they need to work so that they can manage their daily expenses. So, they might not be able to attend the activities in school such as parent day. Some parents also think that they cannot guide their children in learning [7]. As a result, they worried about the academic performance of their children.

1.1.2 Motivation

The purpose to do this project is to help children between 3 to 6 years old learn conveniently and effectively. This mobile application is teaching them to learn the alphabet, words, mathematics, and some test for them. It also provides some entertainment for them such as coloring and drawing. This is because some parents need to work every day to maintain their daily expenses and do not have extra time to teach their children or teach them to do homework [8]. Besides, traditional education is not flexible for children in learning. This is because children are not able to choose the learning time according to their plan and choose the lesson or the subjects interested in [2]. They need to follow the school plan and the school timetable [1]. Thus, one of the purposes to do this project is to solve the problem of not being flexible in traditional education. In addition, the aim to do this project is to help parents in teaching their children effectively and parents are also able to know the performance of their children through the progress report.

1.2 Objectives

- To help children to learn in a more flexible way

First and foremost, the first objective is helping the children to learn more flexibly. Children only attend school five days a week and they are not always staying in school to learn. Children need to follow the timetable scheduled by the school [2]. By developing the education mobile application for them, they can choose the subjects they want to learn. The app will include English and mathematics for children to learn. In addition, it will also include some entertainment such as coloring. This project will provide some quizzes inside the kids' education and learning app. Thus, it can let them test themselves anytime by doing the quiz. It does not limit the time for them to learn, they can learn at any time without the need to follow the schedule. Therefore, the educational app can help children to learn more effectively. This is because they can learn based on their own pace.

- To increase the interactivity level in learning

In addition, this project develops the kid's educational and entertainment mobile application which includes interactivity in teaching children basic knowledge. This app lets children learn more effectively by including quiz. Children can click the button to answer the question in the quiz. So, they can know their weakness and strength in different subjects. Then, they can pay more attention to their weakness by doing more exercise. As a result, interactive learning apps

can solve the problem in traditional education which is the lack of interaction. Besides, it also includes some sound, pictures, and animation inside the app. Children can click the letter, word, or number and the system will play the pronunciation for the children. Therefore, they can learn how to read letters, words, and numbers easily. Besides, this project also includes some coloring and painting systems inside the app. Then, it can attract more users to download this app.

- Develop a progress report for the parents to know the learning progress of their children

Moreover, the objective of this project is to develop a progress report for the parents to know the learning progress of their children. The progress report also can tell parents about the academic performance of their children, then they can know the strength and weaknesses of their children. Then, parents also can know the marks of the quiz for their children. Besides, they can put more effort to help their children to improve the subject their children are weak in. If the parents are from a lower socioeconomic background and they are not able to provide help in guiding their children in homework. So, having the progress report in the app can help them in solving this problem. Parents can see the records and marks earned by their children from the quiz.

1.3 Project Scope and Direction

The objective of this project is to develop an education and entertainment mobile application for children who are under the range of the age between 3 to 6. This application can help them to obtain some basic knowledge of English and mathematics. It can help toddlers and preschoolers to get prepared before going to kindergarten and help children who already study in kindergarten to learn effectively.

First and foremost, the app will include different categories of learning lessons and quiz. The two main subjects included in the app is English and Mathematics. For the English subject, there will have letters and words for children. Besides, children can press the image or the letter to get the voice to teach them the pronunciation. Therefore, children can interact with the image and letter. There will also have some tests such as quizzes for children to test their understanding. Moreover, for the Mathematic part, there are different categories such as the number and mathematic calculation. Mathematic calculations such as add and subtract will be included in the app. Children can learn simple calculations which able to help them to improve

their knowledge when they go to kindergarten. The interface of this app will be designed with colorful pictures and animation to grab the attention of the children. Besides, it also includes some music to increase the satisfaction of children when they play this app. The coloring and drawing module can help in finding out their artistic talent. Besides, it also increases the interaction of the users with the application.

1.4 Contributions

This kids' education and entertainment application can help the children to learn more effectively and flexibly. This application will teach children simple subjects such as English and mathematics. This application will provide the learning lessons such as teaching them letters, words, and mathematics, and provide them with some calculation questions. The calculation question can test the understanding of the children. Besides, it will include some images and animation to increase the understanding of the children. It will keep the children more focused while learning using this app because the colorful image and animation with the music can make them pay more attention. In addition, this application also provides some entertaining functions for children such as coloring and drawing. This app will be able to help parents who are busy with their work and do not have time to teach their children in learning. So, this app will let children learn it on their own at any time. Moreover, this application allows the children to interact with the interface by clicking it. Then, it also provides a progress report for parents to review the result of their children in tests and track their progress on learning.

1.5 Report Organization

In this project, there are seven chapters which are introduction literature review, system methodology, system design, system implementation, system evaluation and discussion, and conclusion and recommendation. Chapter 1 explains about the introduction, problem statements, motivation, objectives, project scope, and contributions. Chapter 2 focuses on reviewing three similar applications. It also includes the review of technologies such as hardware, operating systems, and database. In addition, chapter 3 shows the system design diagram including use case diagram and activity diagram. These diagram shows clearly how the application interact with user by showing the diagram and description. Besides, chapter 4 shows the system block diagram, system flowcharts, and timeline of the project. Chapter 5 focuses on the system operation that explain the steps to interact with the system. System operation includes the screenshot of the user interface of application and description that

explain how it works. It similar like the user manual for teaching the new user to use the application. This chapter also includes the hardware and software setup, and the implementation issues and challenges. Moreover, Chapter 6 shows the system testing, testing setup, result, project challenges and objectives evaluation. Lastly, chapter 7 shows the conclusion and recommendations.

Chapter 2

Literature Review

2.1 Review of the Technologies

2.1.1 Hardware Platform

The hardware platform that I used in developing this kids' educational and entertainment mobile application is Acer Nitro 5. The operating system of this laptop is Windows 10, the processor is AMD Ryzen 7 3750H with Radeon Vega mobile Gfx 2.30 GHz. The graphic of this laptop is NVIDIA GeForce GTX 1650 and it has 12.0GB of memory. The storage is this laptop consisting of 1TB SATA HDD.

The hardware platform to run this mobile application should be the mobile device that is using Android operating system. This is because this application is developed with Android Studio and the mainly designed for Android system user. So, the mobile device with Android operating system is necessary to run this application.

2.1.2 Firmware/OS

The operating system that is necessary to run this application is Android 12. This is because the minimum SDK of this application is set to 33, so the Android device that build with minimum of API level 33 is needed to run this application. If the user uses Android devices which is build with lower SDK version (lower than the API level 33), the problems such installation denied or block, runtime compatibility issues, and the performance of applications may be limited. Therefore, the version of operating system recommended is more than SDK version API level 33 to ensure this mobile application can perform as expected.

2.1.3 Database

Database used in this mobile application is Firebase. Firebase is an app development platform that can help developer to build the app and store data. Authentication stores user id and password and it also used to authenticate the user by controlling the access in application. There are two types of databases in Firebase, which are Real Time Database and Cloud Firestore. In this project, Real Time Database is used to store the data of user. In this application, there are few difficulties mode for two subjects. The quiz score and date time for each quiz will be stored inside the Real Time Database for each user. Besides, progress report

can retrieve this data and shown to user to check their performance. In conclusion, Firebase is chosen because it is easy to use, and it provides various tools that is helpful in developing and managing the application.

2.1.4 Programming language

The programming language used in this project is Java. Java is a popular computer language used to develop the web and mobile application. Java offers object-oriented programming (OOP), and it is extendable and flexible. Developers can reuse the codes and modular projects. Besides, it also includes a lot of libraries for developing the applications [14].

2.1.5 Algorithm

The algorithm used in this mobile application is random number generation within range algorithm. In math quiz function, there is two different modes which are addition and subtraction. These modes have five questions for each test, each question generates the number randomly within the given range. This algorithm can help the developer to reduce the workload because developer do not need to manually create all the quiz questions. Therefore, this algorithm can help the development process to be more efficient and effectively.

2.1.6 Summary of the Technologies Review

In summary, the hardware platform used in developing the mobile application is Acer Nitro 5. The hardware platform required to run the application is mobile device with Android operating system and the SDK version should be minimum API level 33. The database used in this project to store the user data is Firebase Real Time Database. Besides, the programming language used in this project is Java and the algorithm used is random number generation within range algorithm.

2.2 Review of the Existing Applications

2.2.1- Learning games for toddlers



Figure 2.1 The main page of Learning games for toddlers app

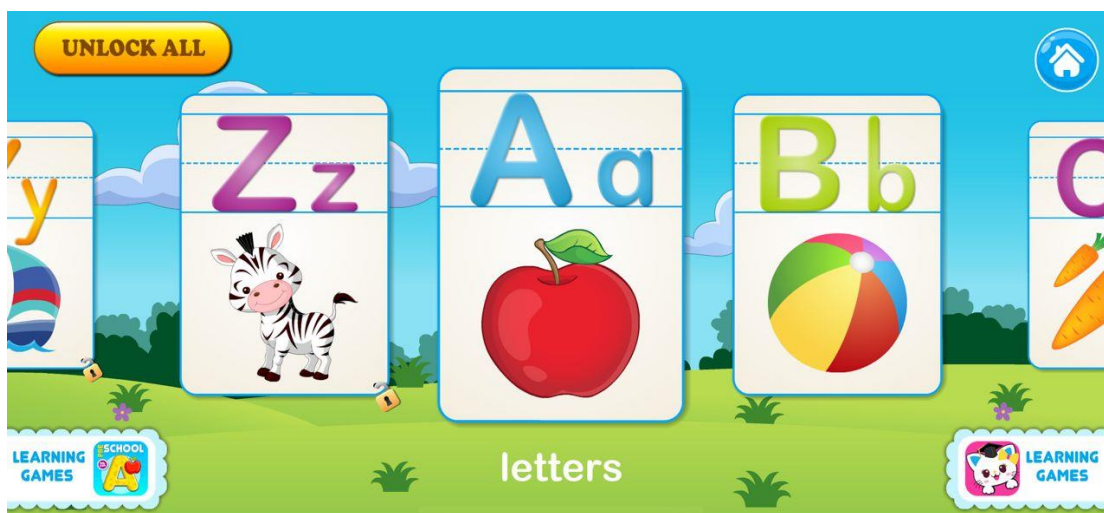


Figure 2.2 Interface shown after pressing the letter option in the main page

Learning games for toddlers is an educational app developed and published by CGC s.r.o. This is a free teaching app that focuses on helping children to learn in a funnier way. It focuses on teaching the alphabet, letters, shapes, and spelling. Figure 2.1 shows the main interface for children in choosing the type of topics they are interested in. Figure 2.1 shows that there are three topics which are letters, games, and words. After pressing the letters, it shows the interface in Figure 2.2. Then it shows the alphabet for children to choose what they want to learn. Then, when the child press games, it will show all the alphabet for them to choose from. For the words, it will show all the words and let them choose.

Strength:



Figure 2.3 The interface after matching the letters needed

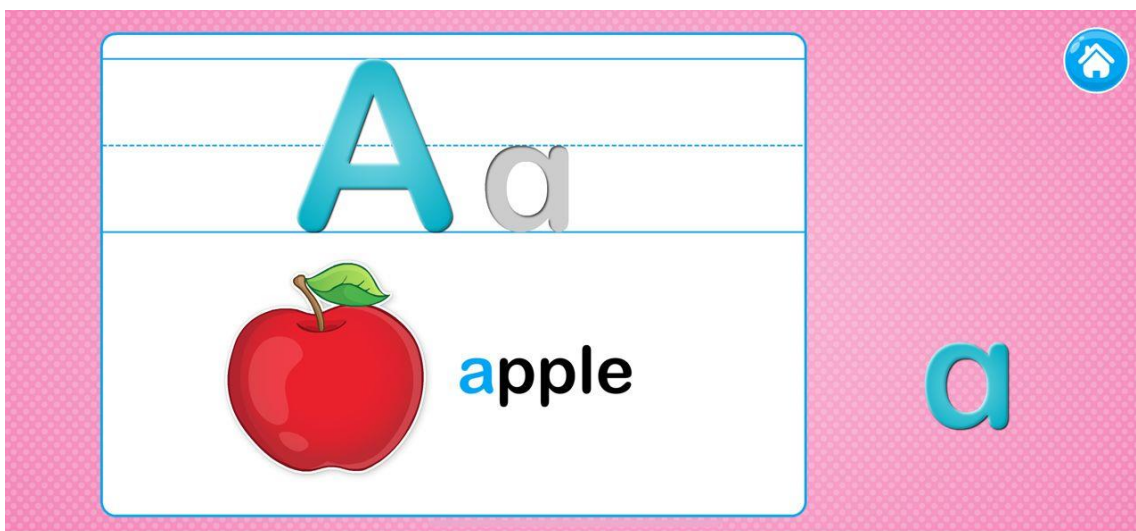


Figure 2.4 The game that let child to drag the letter to the specific location



Figure 2.5 The game that pop the balloons which contain the letter

In addition, there are many strengths for the Learning games for toddlers app. One of the strengths of this application is user-friendly and easy to use. This app is designed for children, so it needs to be simple and easy to use. Then, it contains the sound effect which able let children to learn the word easier and it also able to attract the children to learn while playing the game. It also provides the pronunciation of the word while children touch the word in the Figure 2.3. This application is free to download. So, it can attract more parents to download it for their child. This app allows children to play in offline mode. So, even if the child is in the area which does not have Wi-Fi provided, the child also able to play the game. Besides, this kids' educational app is interactive because it let them to play the letter and word in jigsaw puzzle mode. Figure 2.4 shows that it let the child to drag the pieces of the letter and place in the right location. After placing all the letter pieces correctly, it will play the sound of the letter or word for them. Then, it also contains the mini game such as pop the balloons of the specific letter

Weakness:

On the contrary, there are also many weaknesses in this educational mobile app. The first weakness is the app inside is not free for unlocking all lessons. If the child wants to unlock all the letters, games, or words, they need to pay. The advertisement is always pop out to remind the child to buy the package to unlock the letters or words. Besides, the weakness of this app is lack of teaching game and lesson. it only contains letters and words for children to play. It does not contain the subject such as mathematic or other entertainment such as coloring. In addition, this app is lack of login system. So, if the child has completed a lot of learning game

and already reach the high level. After changing the device or accidentally deleted this application, the records will all disappeared. The child needs to learn and play again the lesson from the beginning. Therefore, it is one of the weaknesses of this application. This application does not contain the setting option for users. Without the setting option, parents and children are not able to change the setting such as the volume of the music. Then, it does not contain the progress report. Parents are not able to know the progress of learning of their child.

Solution:

The solution for solving the first weakness of this education app is make all the lessons free of charge for children. Then, they can learn according to their own plan without the need to pay for unlock the items. In addition, the second solution is reducing the advertisement that pop out in the screen, the developer can make the specific button only for them. Then, lack of teaching game and lesson can be solved by adding more different subjects inside the app. So, child can obtain more knowledge about different subjects such as mathematic. The developer also can include some entertainment game such as color or mini games. Moreover, the developer should include the login function because the data need to be saved in the database according to the account of the child. The developer adds the progress report inside the application to solve the problem of lacking the progress report. So, parents can know the learning progress of their children.

2.1.2 – 123 Bubble Kids Learning Games



Figure 2.6 The main page of the 123 Bubble Kids Learning Games



Figure 2.7 The interface after pressing the button on the school

123 Bubble Kids Learning Games is the kids educational game application is developed by CFC s.r.o. . This application is developed by an education studio which has winning the award before. This education studio is 22learn which is the creator of the best-selling Abby Basic Skills app. Figure 2.6 shows the main page of the app which contain two sections, one button is on the school building and another one is on the forest. After pressing the button on the school building, the interface will be shown as the Figure 2.7. Figure 2.7 shows different kinds of subjects and lessons prepared for the children to learn. According to the description on the App Store, it mentions that there are 10 educational learning categories, 220 interactive first words flash cards and 3 engaging kids learning games. It contains various lessons to children such as teaching them letters, numbers, shapes, colors, animals, fruits, toys and vegetables.



Figure 2.8 Interface of the first choice in the (Figure 2.7)



Figure 2.9 Game from “BUBBLE POP” option in (Figure 2.8)

Strength:

The first strength of this app is easy to use and user-friendly especially for children. The target users of this educational mobile application are children who under toddlers and preschool category. The application is designed with multimedia element such as text, graphic, audio, and animation. The second strength of this application is it includes various type of learning games, categories, and interactive game. This can help children in learning effectively because they able to understand easily. 123 Bubble Kids Learning Games app contains the lesson such as letters, numbers, shapes, color, toys, animals, fruits, and vegetables. It is not only including the letters for children to learn, but it contains various type of subjects for them. Therefore, children able to learn more from this application. After pressing the first choice in Figure 2.7, the Figure 2.8 shows that there are three options for children to play. The third strength of this application is it is creative because it allows child to learn by playing game such as pop the bubble such as Figure 2.9. Besides, the strength of this app is it consists of setting function. The setting function need user to press it and hold for few seconds, then only can open the setting page. Then, this app allows users to play both offline and online modes. Besides, it also contains the sound of letter or number when the child press it.



Figure 2.10 The advertisement to attract user to pay for unlock all the games

Weakness:

Nevertheless, it also contains some weaknesses inside the application. One of the weaknesses of this app is the app inside is not free to play all the learning categories and games. Parents need to pay to unlock all the games and categories such as Figure 2.10. In addition, the second weakness of this application is lack of login system. So, if the children change the device to play this app, they are not able to continue their last lesson and level. Then, the children need to redo again all the lessons and games. Besides, the third weakness of this app is it does not contain the progress report. Progress report is helping the parents to know their performance of their children and know what the weak area of their children is. Figure 2.6 shows that the main page of the app, it only contains two options and it is lack of information because didn't include the words. So, it may make children hard to find when they want to choose the learning option.

Solution:

In addition, the solution that can be used to solve the first weakness which is the app inside is not free is that that the developer needs to make the learning games and categories to free. Then, children can learn more from this education app. Besides, the solution to solve the problem of lacking login system is the developer should make the login system for users. The login page can include the place for user to enter their e-mail address and the password. Then, it can help them to keep the data in the database, it also able to protect the information of user effectively. Additionally, the problem of lacking progress report can be solved by develop the progress report feature inside the app. This progress report includes the lessons that the child

has learned and their test result. The method to solve the problem that the main page is lack of information is to include the word such as “Learning” to tell children that the button will navigate them to the learning section.

2.1.3 – ABC Kids-Tracing & Phonics



Figure 2.11 Main page of ABC Kids-Tracing & Phonics

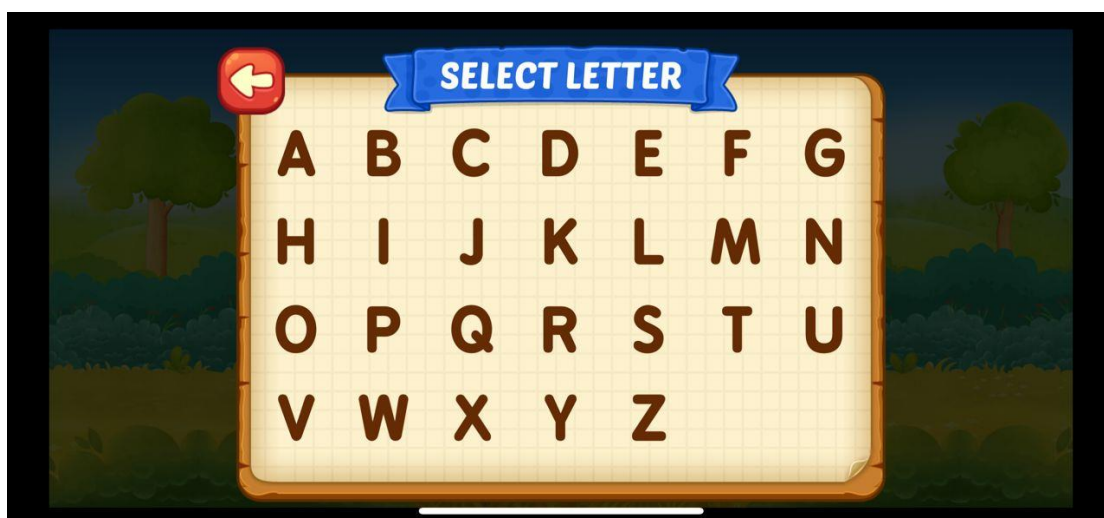


Figure 2.12 The interface of first option in (Figure 2.11)

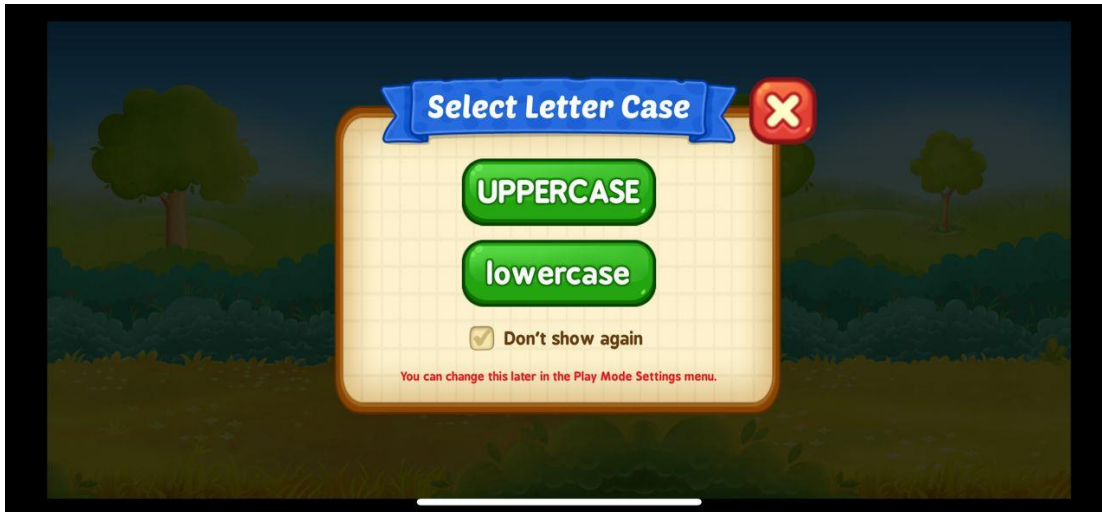


Figure 2.13 Interface shown after pressing the option 3 in (Figure 2.11)

ABC Kids- Tracing & Phonics is educational app that developed and published by RV AppStudios LLC on 3 March 2016. ABC Kids is a free app teaching app that focus on helping the children to learn in a funnier way. It is focus on the children who are under the range from toddlers to kindergarten. Figure 2.11 shows that that is the main page interface of the ABC Kids. There are six different types of learning games for kids. It helps them to recognize the alphabet, letter shapes with the phonic sounds. It also includes the matching exercises for kids to test their understanding. After pressing the first option which contains “ABC” word. Then, it will show the Figure 2.12, it shows all the letters for children to choose which one they want to learn. Then, for the option 3 in the Figure 2.11, after clicking it, it shows the choices for the user to choose. They also can choose the fix letter case in the setting option.



Figure 2.14 The lesson that teach letter in option 1 from main page

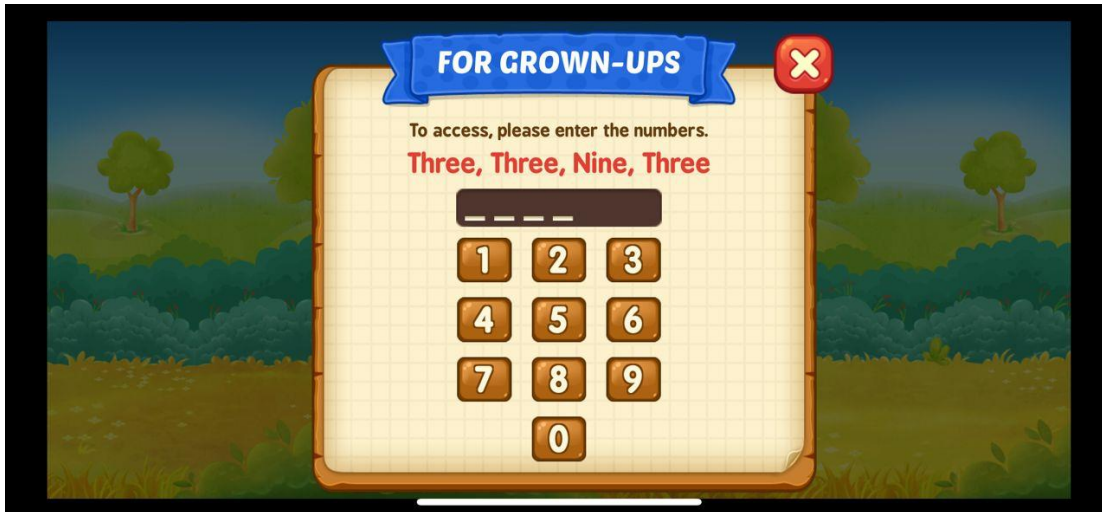


Figure 2.15 The interface pop out after select the setting

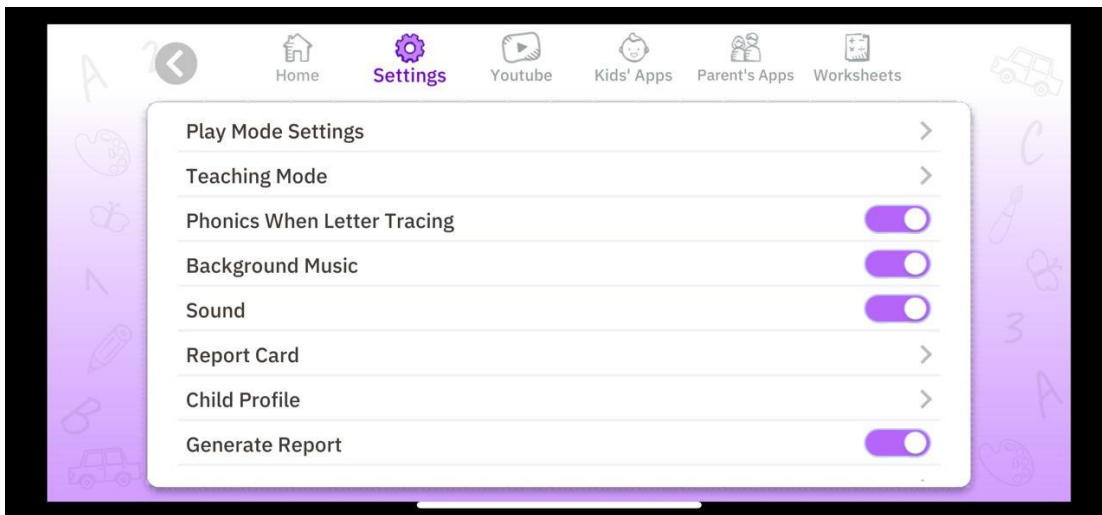


Figure 2.16 The interface of setting

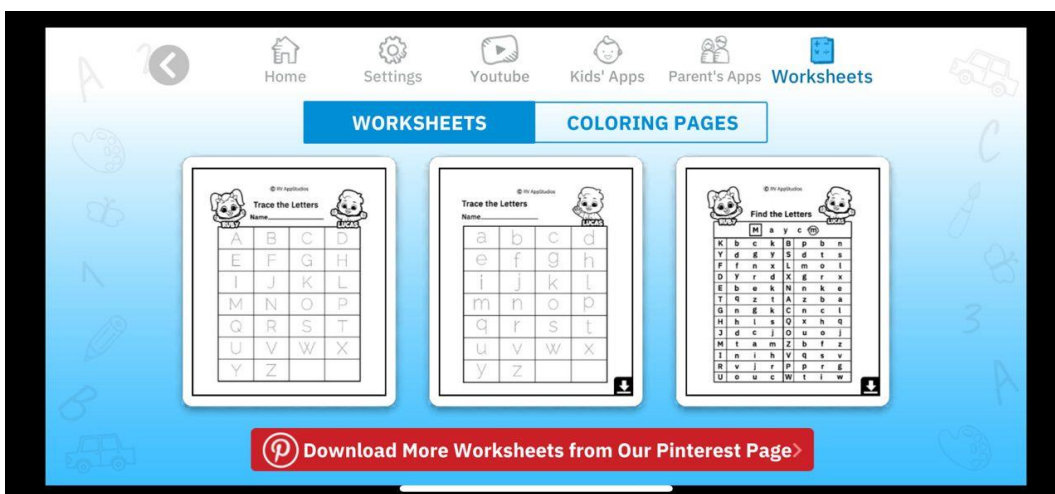


Figure 2.17 The worksheets and coloring pages in ABC Kids

Strength:

The first strength of ABC Kids app is free to download, and it is available on Android, iPhone, and iPad. In addition, it is user-friendly and not complicated for children. Then, this app has various type of education games for children to learn. For example, the ABC tracing games, phonics pairing, and letter matching are designed for children in learning. Then, the third strength is the user interface is attractive and colorful. Therefore, it can drag the attention of children when they are learning using this app. Besides, this app does not contain the third-party advertisement, and it also free for all lessons inside the app. This is because some app needs user to purchase the packages to unlock the lessons and subjects. In addition, Figure 2.14 shows that this app is teaching the user letter by letting them write the letter according to the line given. This is because by letting the children to write it own able to increase their memorization for that letter. Moreover, Figure 2.15 shows that the if the users want to access the setting, they need to enter the numbers according to the word provided. This can help the app to control the access to the setting page. Then, the strength of ABC Kids app is it contains the report (Figure 2.16). Parents can refer to the report to see what their child has done, with the date and time recorded in the report. Besides, ABC Kids also provides the worksheets and coloring pages for children to print out to do.



Figure 2.18 When user want to quit this lesson



Figure 2.19 The game shown from the option 3 in the main page



Figure 2.20 After pop the balloon in (Figure 2.18), the word will be shown

Weakness:

The first weakness of ABC Kids app is the pronunciation of the letter is not standard. The second weakness of this app is difficult to exit the lesson. Figure 2.18 shows that when the child wants to exit this lesson, they need to press the 'x' button by holding it and drag it to the left. Therefore, this action is waste time and difficult to use. Besides, the app does not contain other subject such as mathematic for children. It only contains the letter and word for children which is not enough for children. This is because they need to learn more subject to gain more knowledge. In addition, it does not have the login function. It is hard for children to keep their records after they change device or reinstall the app. There is lack of mini game in this app, such as coloring game. Moreover, it does not allow children to select the word they want to

learn for the specific letter. It shows the letter for children to pop the balloon and then show the Figure 2.20. It is less interactive in this lesson because it only read the word once and not allow children to click it and read again the word.

Solution:

The solution for the first weakness is put the right pronunciation of the letter for teaching the children. Then, the problem that it is difficult to exit the lesson can be solved by removing this action, the developer can directly put the exit button without the need for user to press and hold then drag to the left. In addition, the developer can add another subject such as mathematic into the app. So, the app will consist of more lessons for children to learn and it also can attract more users download this app. Then, it should include the login function for user to login with their email and password. Their data can be saved in database according to their account. The problem of lack of mini game in this app can be solved by adding more mini game in this app. Then, children may become more satisfaction in using this app. Besides, it also can include some coloring game inside the app. Then, the developer also can increase more interaction for this app such as let user to click the word and it will read again the word.

System	Strength	Weakness
Learning games for toddlers	<ul style="list-style-type: none"> - User-friendly - simple and easy to use - Contain sound effect - Free to download - Have offline mode - Interactive 	<ul style="list-style-type: none"> - Need to pay for unlocking all lessons - Lack of teaching game and lesson - Lack of login system - No setting functions - Do not have progress report
123 Bubble Kids Leaning Games	<ul style="list-style-type: none"> - User-friendly - Contain multimedia elements such as graphic, audio, animation - Interactive - Have various subjects - Have setting function - Have offline mode - Free to download 	<ul style="list-style-type: none"> - Need to pay for unlocking all lessons and game inside the app - Lack of login system - Do not have progress report - Lack of information in the main page of the app (do not include the words)
ABC Kids – Tracing & Phonics	<ul style="list-style-type: none"> - Free to download - Available on multiple device - User friendly - Have various games and lessons - User interface is attractive and colorful - No advertisement and it is free for all lessons - Control the access to the setting page - Contain report - Have worksheet and coloring pages for printing out to do 	<ul style="list-style-type: none"> - Pronunciation is not standard - Difficult to exit the lesson - Do not have another subject such as mathematic - Lack of login system - Lack of coloring game - Less interactive because it only read the word once and do not allow user to click it

Chapter 3

System Methodology/Approach

3.1 Methodologies

The methodology that most suitable in this project is RAD (Rapid Application Development). RAD is the development methodology that able to produce the high-quality system. The benefit of RAD is flexible to modify at every development process [8]. RAD able to reduce the investment cost. In a market that moves swiftly, RAD process enables developer to adapt quickly to changing the requirement [9]. Besides, RAD is communicate regularly with the client to collect their feedback and design the product according to their needs [8]. Therefore, it can increase the efficiency in building the design.

There are four phases of RAD which are requirement planning, user design, construction, and cutover. First and foremost, the first stage is requirement planning phase. Requirement planning stage is where the developer, team member and client to communicate together to understand and determine the goals, expectations, and the budget of the project [10]. In addition, the second stage is user design. User design is same as prototyping in which developer start to create the prototype and the client will work together with developer in this stage to ensure that the prototype meets their requirement [10][11]. By ensuring that the design meets their requirement, the client will check the prototype and give feedback to developer and team members. Then, the developer and team members will modify the model until it meets the requirement and satisfaction of client [11]. Furthermore, the third phase is construction stage. In this stage, the developer and team members will take the prototypes and make them to become the working model. The developer and team members start coding for the application, system testing and unit integration. Lastly, the final phase is cutover which is same as implementation. In the implementation stage, the developer and team members launch the final product. This phase includes data conversion, testing and documentation [10].

3.2 System design Diagram

3.2.1 System Architecture Diagram

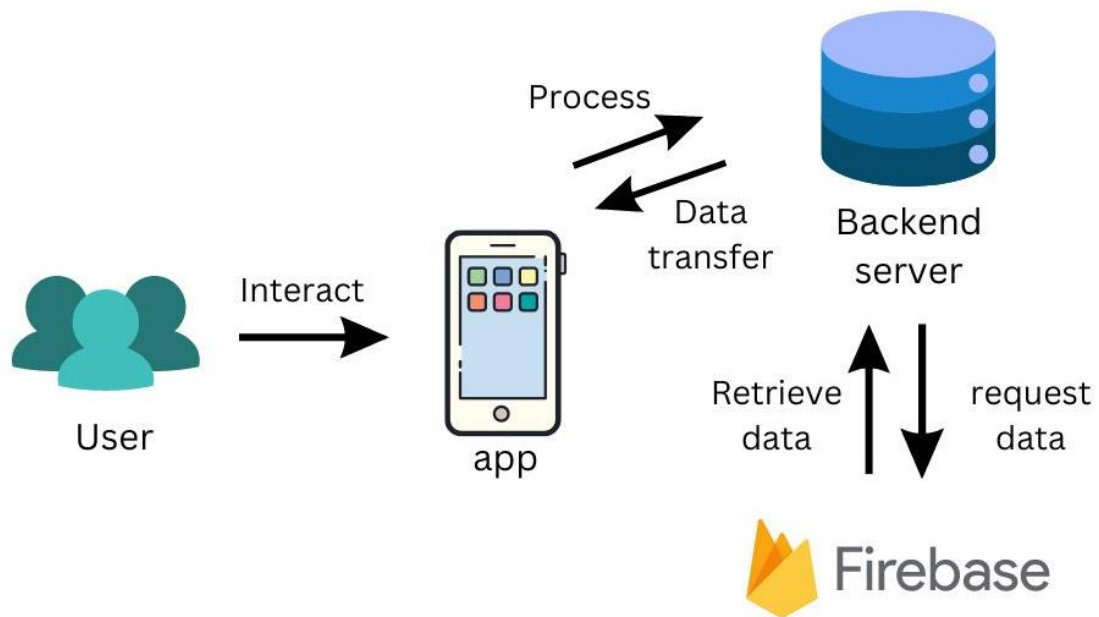


Figure 3.1 System Architecture Diagram

Figure 3.1 shows the system architecture diagram of this mobile application. First, user interacts with the application, then the application will process the request of user to the backend server and get the data. If the data is saved inside the firebase, then the backend server will request the data from the firebase real time database. After retrieving the data from firebase, then backend server will transfer the data back to the application and show to user through user interface.

3.2.2 Use Case Diagram

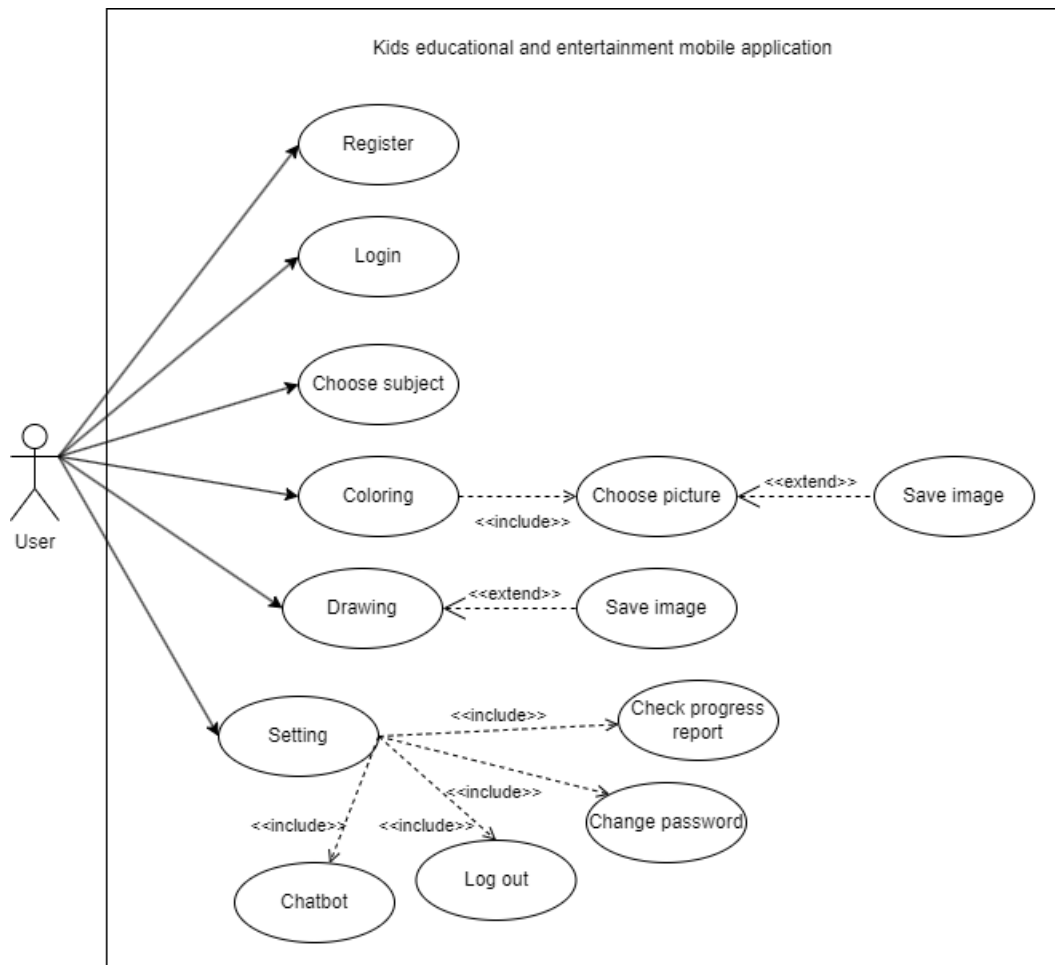


Figure 3.2 Use case diagram

Figure 3.2 shows the use case diagram of kids educational and entertainment mobile application. There is one actor in this application, which is user. For new user who does not have account, this user needs to register to create a new account. It can help user to keep the data so that user can view back the record and continue for learning next time. After creating the account, user can enter the user id and password to login to the homepage. In homepage, user can do the function such as choosing subject for learning or quiz, coloring, drawing and setting. User can choose the subject they want to learn and do quiz. This application provides two subjects which are English and Mathematic. User can choose coloring by clicking the coloring button, then user can choose the picture they want to color. User can choose the color from the color list provided, then color the picture chosen. Then, user can choose to save the picture into their mobile by selecting the save button. In addition, user can draw in the paper by selecting the drawing button in home page. Then, user can save the picture by downloading it. Besides, user can check progress report, change password, and log out through the setting

function. User can click the progress report button to check the learning progress and performance in quiz. Then, if user wants to change the password, user can click the change password button and enter the new password. Besides, user can do revision by choosing the chatbot function. Lastly, user can log out from the current account by selecting log out icon.

3.1.3 Activity Diagram

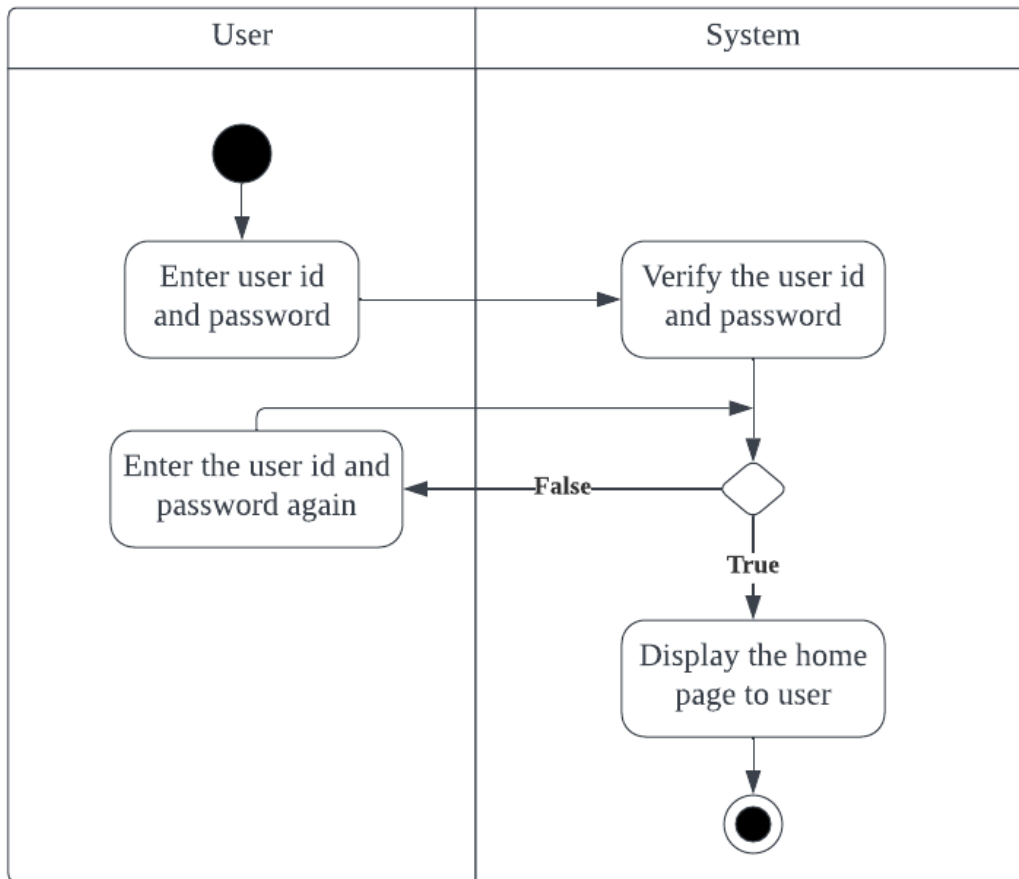


Figure 3.3.1 Login activity diagram

Figure 3.3.1 shows the login activity diagram. First, user needs to enter user id and password before entering to the homepage. Then, the system will verify the user id and password entered by user. If the user id and password is valid and correct, system will navigate user to the home page and display the home page content to user. However, if the user id or password entered by user are incorrect and not valid, the system will need user to enter again the user id and password. Then, after the user enter the user id and password again, it will send back to system to verify. If the user id and password entered are incorrect, the system will continue the process

until they enter correctly. After the user id and password are verified and they are entered correctly, then the system will display the home page to user.

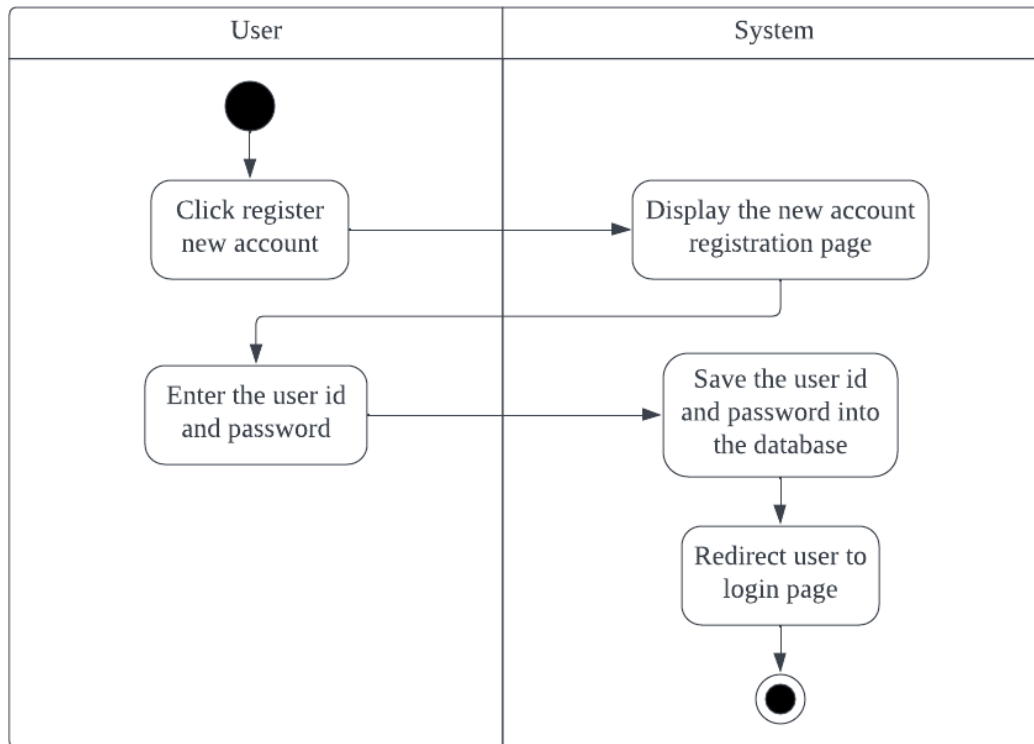


Figure 3.3.2 Register account activity diagram

Figure 3.3.2 shows the create account activity diagram. If user wants to create the new account or the user is new user, they need to click the register new account button, then the system will display the new account registration page to user. Then, user needs to enter the user id and password. After filling the information, system will save the user id and password into the database. Then, the system will redirect user to the login page to let user to log in.

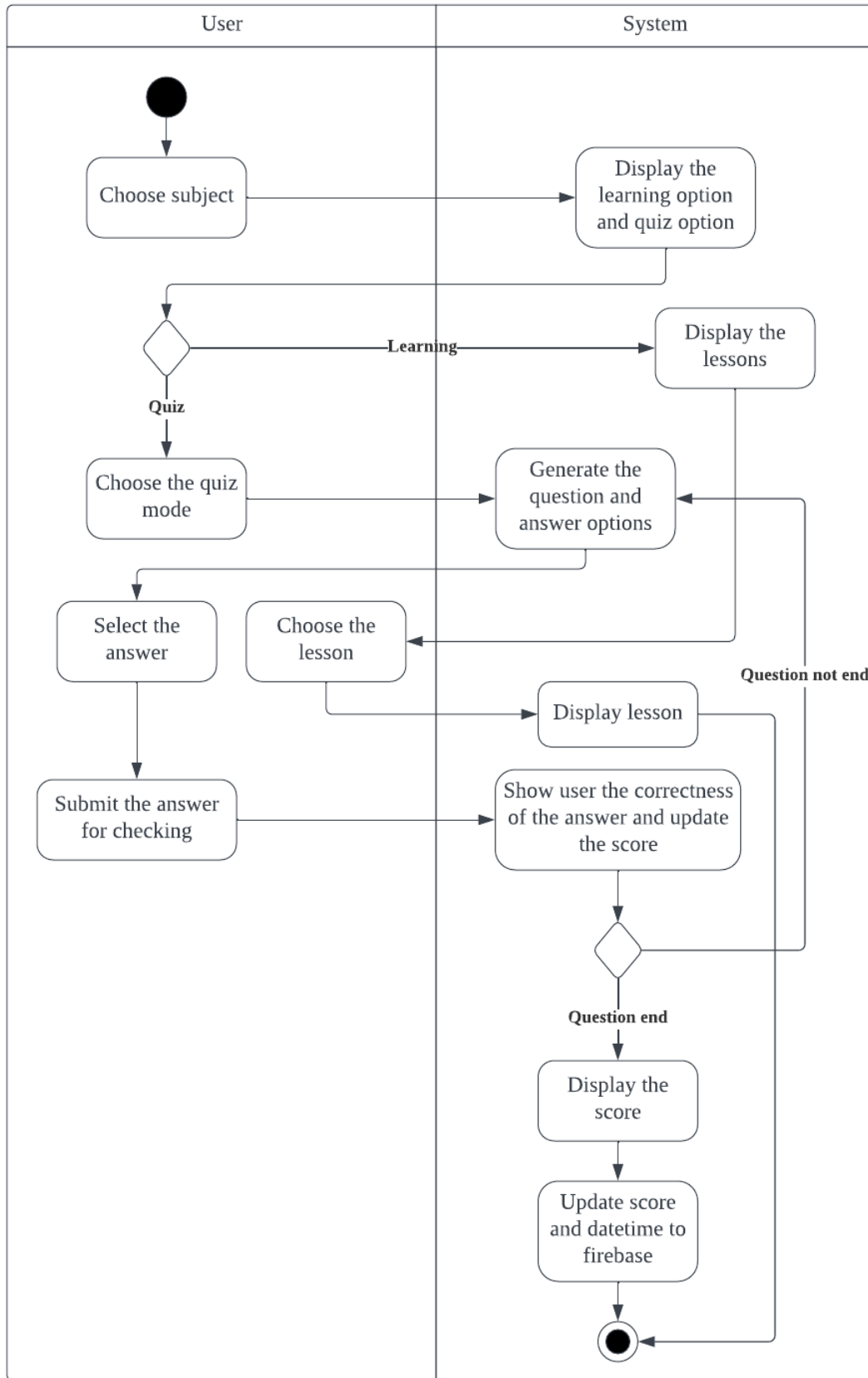


Figure 3.3.3 Choose subject activity diagram

Figure 3.3.3 shows the activity diagram that explain the flow of choosing subject. In home page, user can choose the subject that he or she want, there are two subjects which are English and Mathematic. If user want to learn English, user needs to click the English button. After clicking the button to choose the English subject, the system will display the two options which are learning and quiz. If user choose learning, the system will display the lessons for user to choose. Then, user can choose the lesson to learn. The system will update the learning progress into the progress report. Besides, if user choose quiz, the system will display the quiz mode for user to choose. After selecting the quiz mode, system will generate the question and the answer options for user. Then, user can select the answer. After user click the answer, the system will show the correctness of the answer and update the score. After answering one question, the system will continue generate another question for user to answer. If the quiz is end, the system will display the score. Then, system will update the score into the firebase database.

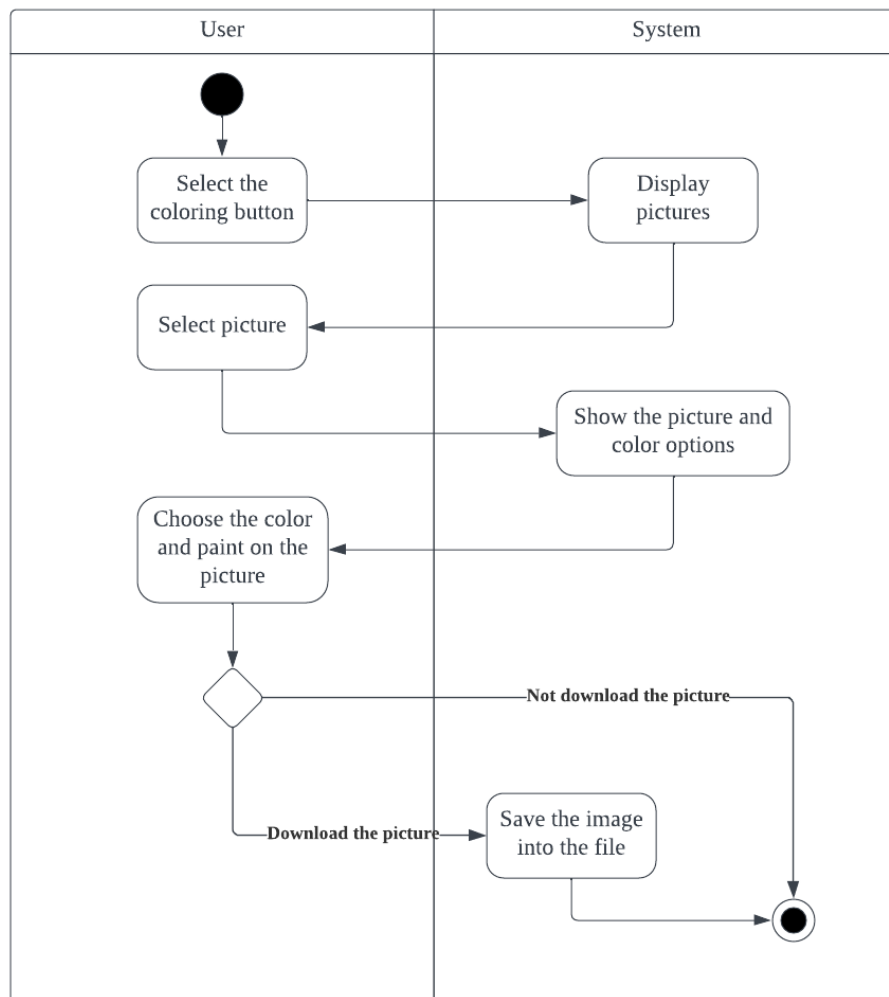


Figure 3.3.4 Coloring activity diagram

Figure 3.3.4 explain the flow of the coloring module. First, user can select the coloring button, then the system will display the pictures for user to choose. Then, user can select the picture by clicking the picture. The system will show the picture by navigate user to the picture selected and display the color options for user. User can choose the color and paint on the picture. After done coloring, user can download the picture by selecting the save button. System will save the image to the mobile device file. If user do not want to download the picture, they can quit the coloring section.

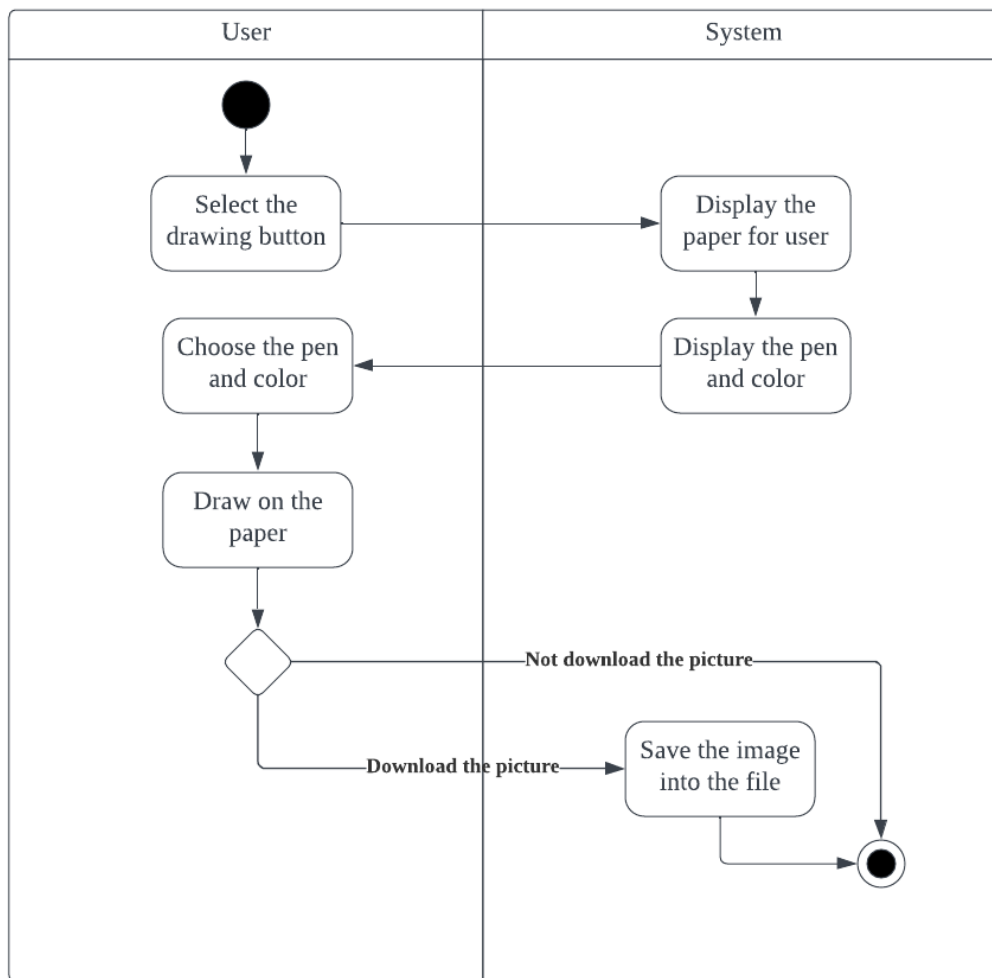


Figure 3.3.5 Drawing activity diagram

Figure 3.3.5 explain the flow of the drawing function. In the home page, user can select the drawing button. Then, the system displays the paper for user. Then, the system will display the pen and color for user to use. The user can choose the pen and color they want and start drawing on the paper. After finish drawing, user can choose to download the picture through selecting

the save button. Then, this image will be saved into the mobile device file. If user do not want to download the picture, user can quit the drawing section by clicking the back button.

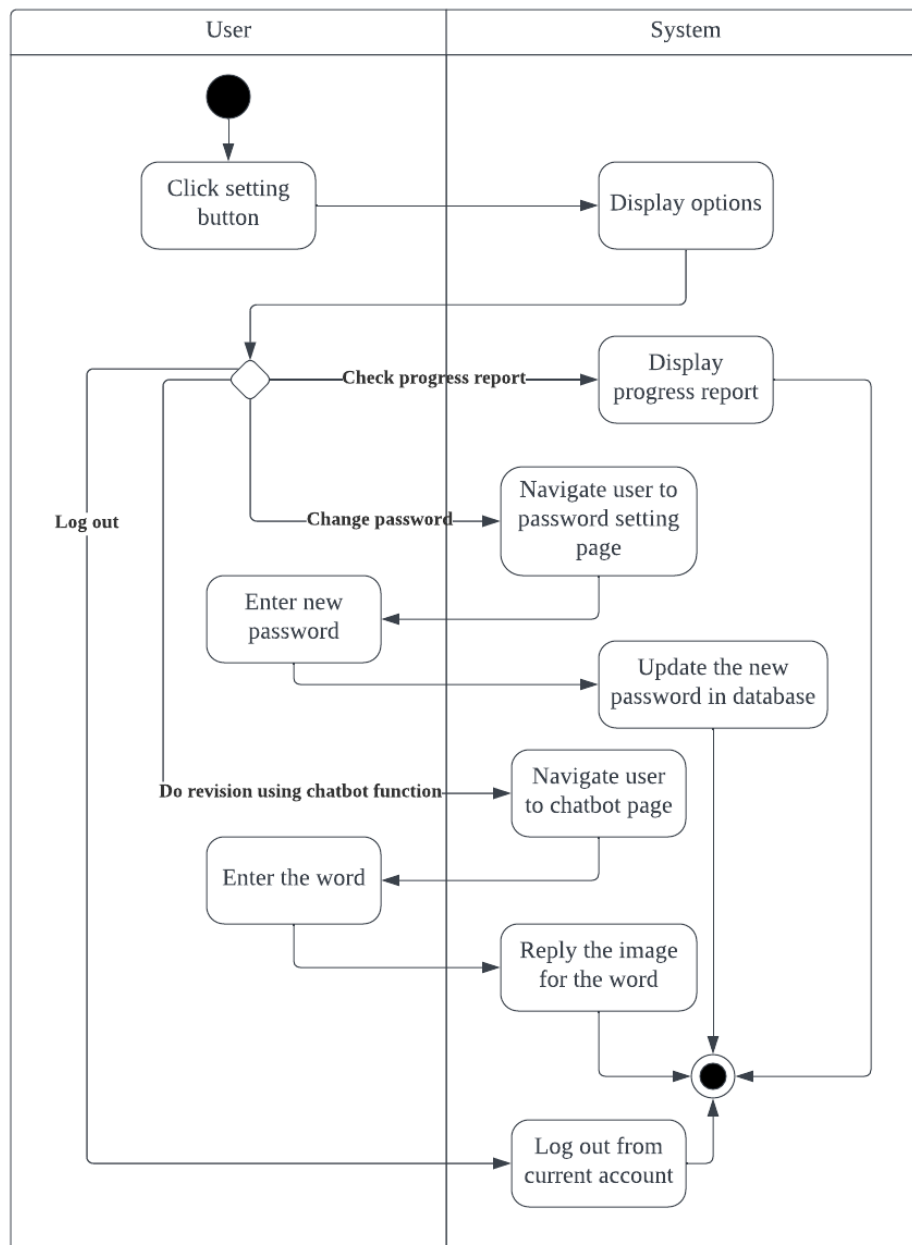


Figure 3.3.6 Setting activity diagram

Figure 3.3.6 shows the setting activity diagram. User can click the setting button in the home page. Then, the system will display the options for user to choose which are check progress report, change password, and log out. If user wants to see the progress report, user can click the progress report button and system will display the progress report which has recorded the quiz score and lesson progress. Then, user can click the back button to back to the setting page.

If user want to change their password, user can click the change password option, then the

system will navigate user to the password setting page. Then, user can reset the new password. After the system receive the new password, it will update the password in the database. If user want to do revision by using the chatbot function, user can click the chatbot icon. Then, the system will navigate user to chatbot page, user can type the word they want to search for the image as revision. Then, system will display the image of the word. If user want to log out from the current account, user can click the log out icon. Then, user is logged out from the account.

Chapter 4 System Design

4.1 System Block Diagram

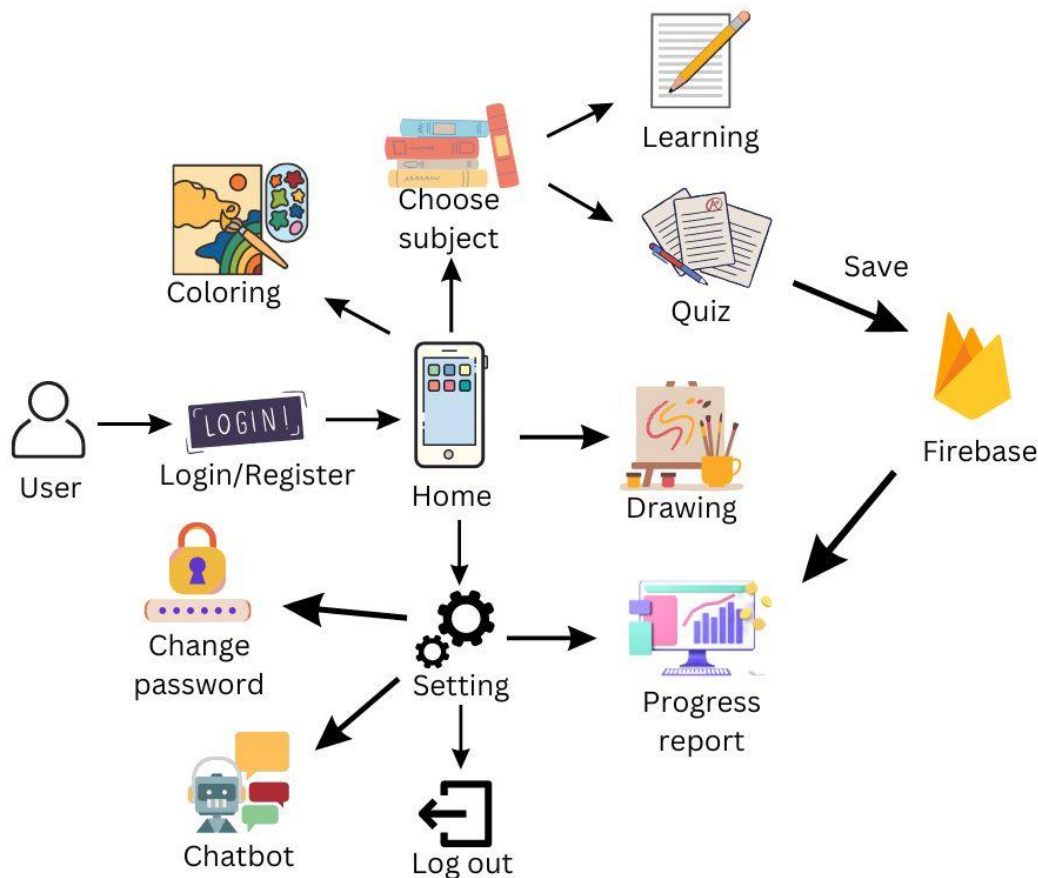


Figure 4.1 Block diagram

According to Figure 4.1, it shows the block diagram of the kids educational and entertainment mobile application. First and foremost, user need to login their account to enter the home page, this is because it can help user to keep the records in the database. If user does not have account, they can click the create new account button to create the new account and then login to the home page. In home page, there are many modules that can let user to use, which are choosing subject, drawing, coloring, and setting. For the choose subject module, user can choose the subject they want, there are two subjects contained which are English and Mathematic. After choosing the subject, the system will show two options for user which are learning and quiz. Then, user can choose they want to learn by clicking the learning button or test their understanding by clicking the quiz button. After taking the test, the system will calculate the score. Then, the system will record the score obtained in the progress report. Besides, user can

do coloring by selecting the coloring option in the home page. Then, user can choose the picture and start to color the picture chosen. In addition, user can choose drawing in the home page. Then, user can choose the pen and color they want to draw on the paper. Furthermore, there are setting button in the home page. User can click the setting button and system will show the progress report button, log out button and change password button. User can view the progress report to know their academic performance. User can change their password by selecting the change password option, then user can enter the new password. User can do revision by selecting the predefined rule chatbot. User can log out from their account by selecting log out icon and quit the app.

4.2 Flow Chart

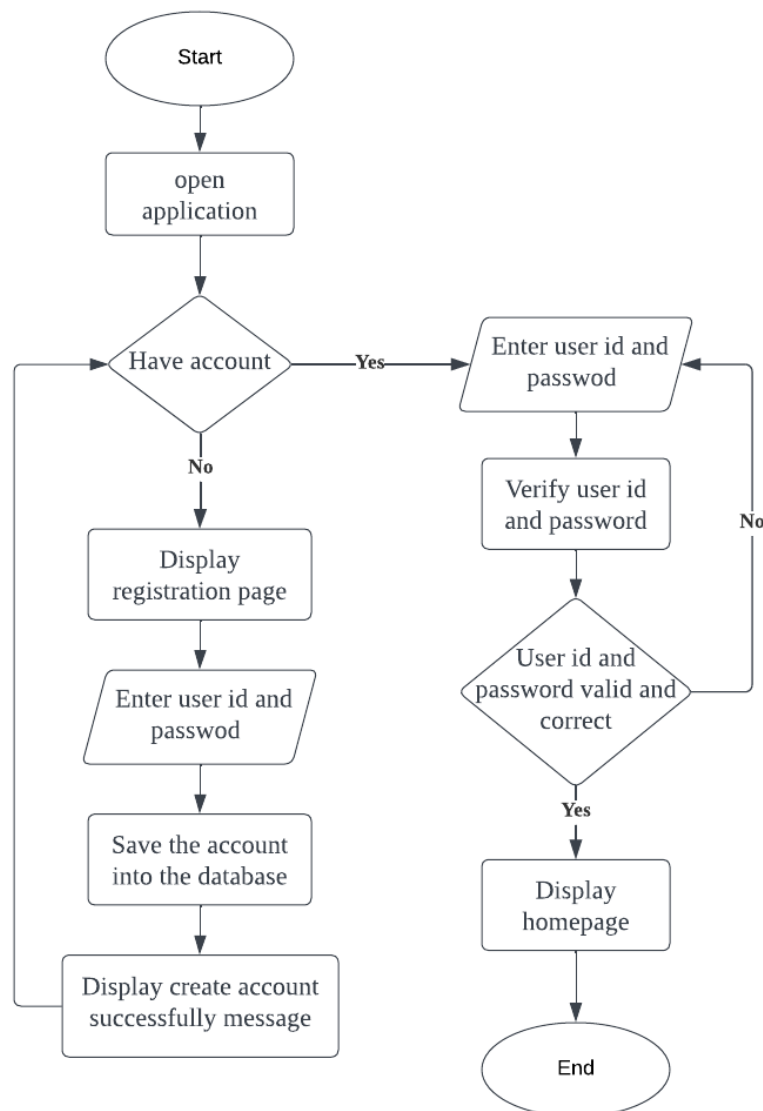


Figure 4.2.1 Login and Registration flow chart diagram

Figure 4.2.1 shows the login and registration flow chart diagram. First, when user open and run this application, it will show the login page for user. If user already have the account, user can directly enter their user id and password. Then, the system will validate it, if the user id and password entered are correct, then system will display the homepage for them. If the user id or password entered is wrong, they need to enter again. However, if user do not have the account, they can click register button and system will shows the registration page. User can enter user id and password then click the save the account button. System will save it into the database. It will display the notification that the account created successfully and go to the login page for user to login.

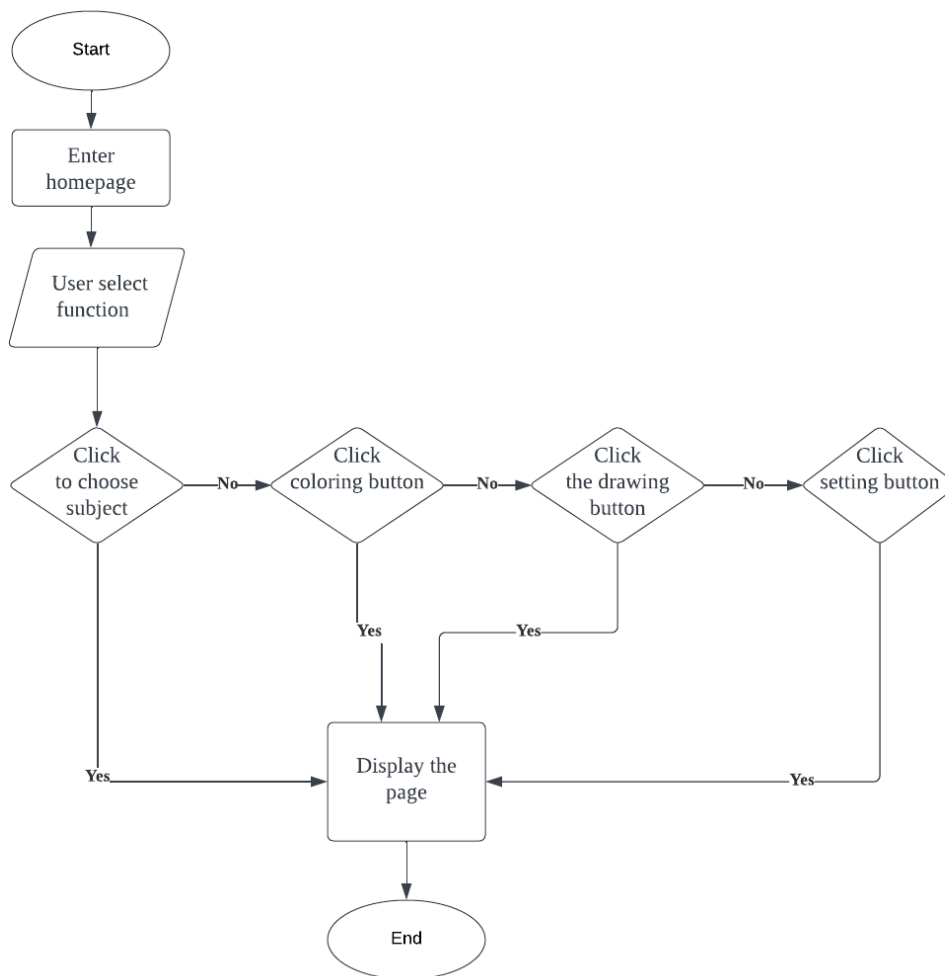


Figure 4.2.2 Homepage flow chart diagram

Figure 4.2.2 shows the homepage flow chart diagram. First, when user enter to the homepage, user can select the function they want. If user want to select the subject, system will display Bachelor of Information Systems (Honours) Business Information Systems Faculty of Information and Communication Technology (Kampar Campus), UTAR

the specific subject page for user. If user want to do coloring by clicking the coloring button, the system will display the coloring page for user. If user want to do drawing by clicking the drawing button, the system will display the drawing page for user. If user want to go to the setting page by clicking the setting button, the system will display the setting page for user.

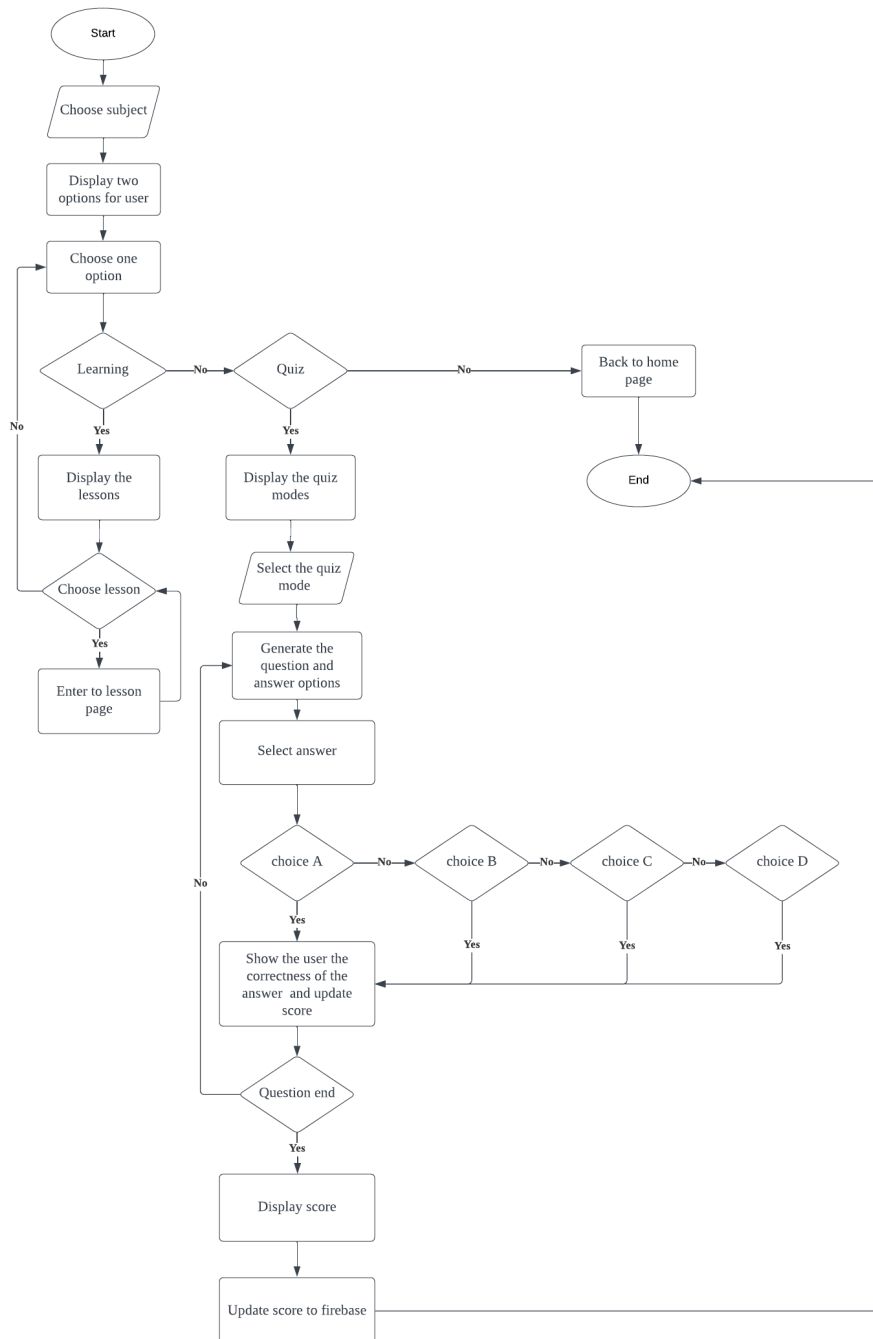


Figure 4.2.3 Choose subject flow chart diagram

Figure 4.2.3 shows the choose subject flow chart diagram. When user choose the subject they want, then the system will display two options which are learning and quiz. If user choose the lesson button, then system will display the lessons for them to choose. After user click the lesson, system will bring user to the lesson page they select. If not, they can go back to the subject page to choose again the option they want. If user choose the quiz option, system will display the quiz mode for user to choose. After choosing the quiz mode, system will generate the question and answer options. Then, user can select the answer they want. After user choose the quiz option, the system will show user the correctness of the answer and then update the score. After answering all the questions, system will display the score and update the mark into the firebase database. If user want to quit this page, they can press the back to homepage button.

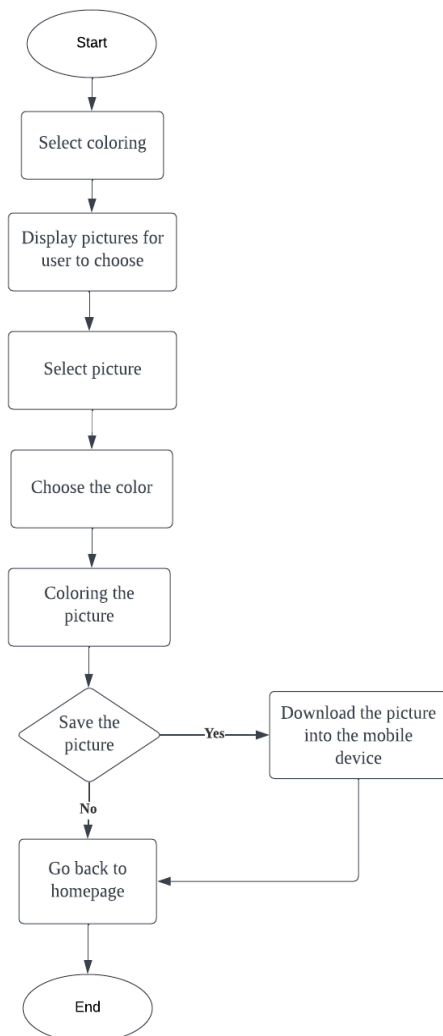


Figure 4.2.4 Coloring flow chart diagram

Figure 4.2.4 shows the coloring flow chart diagram. If user chooses the coloring function, the system will display the pictures for user to choose. After selecting the picture they want, they can start to coloring the pictures by choosing the color they want. After finish coloring, user can choose to save the picture. If user want to save the picture, they can download the picture into their mobile device. If user do not want to save it, they can go back to the homepage.

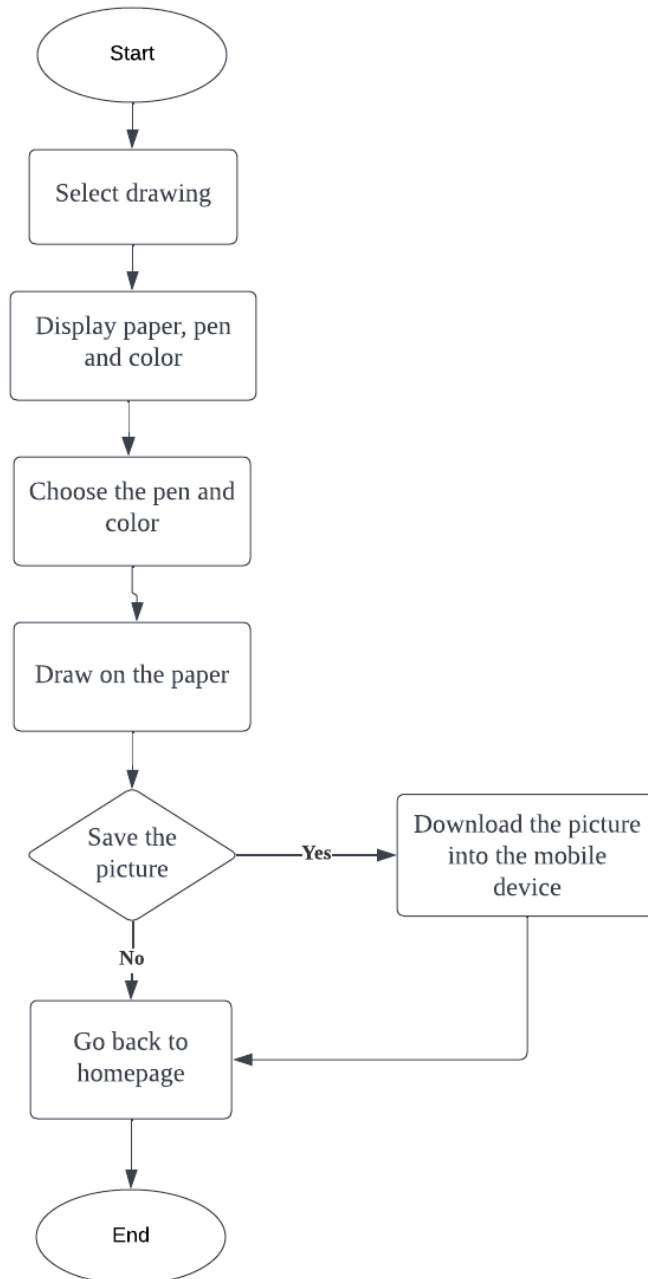


Figure 4.2.5 Drawing flow chart diagram

Figure 4.2.5 shows the drawing flow chart diagram. If user chooses the drawing function, the system will display the paper, pen size and color for user to choose. Then they can start to draw

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on the paper by choosing the color they want and the brush size they want. After finish coloring, user can choose to save the picture. If user want to save the picture, they can download the picture into their mobile device. If user do not want to save it, they can go back to the homepage.

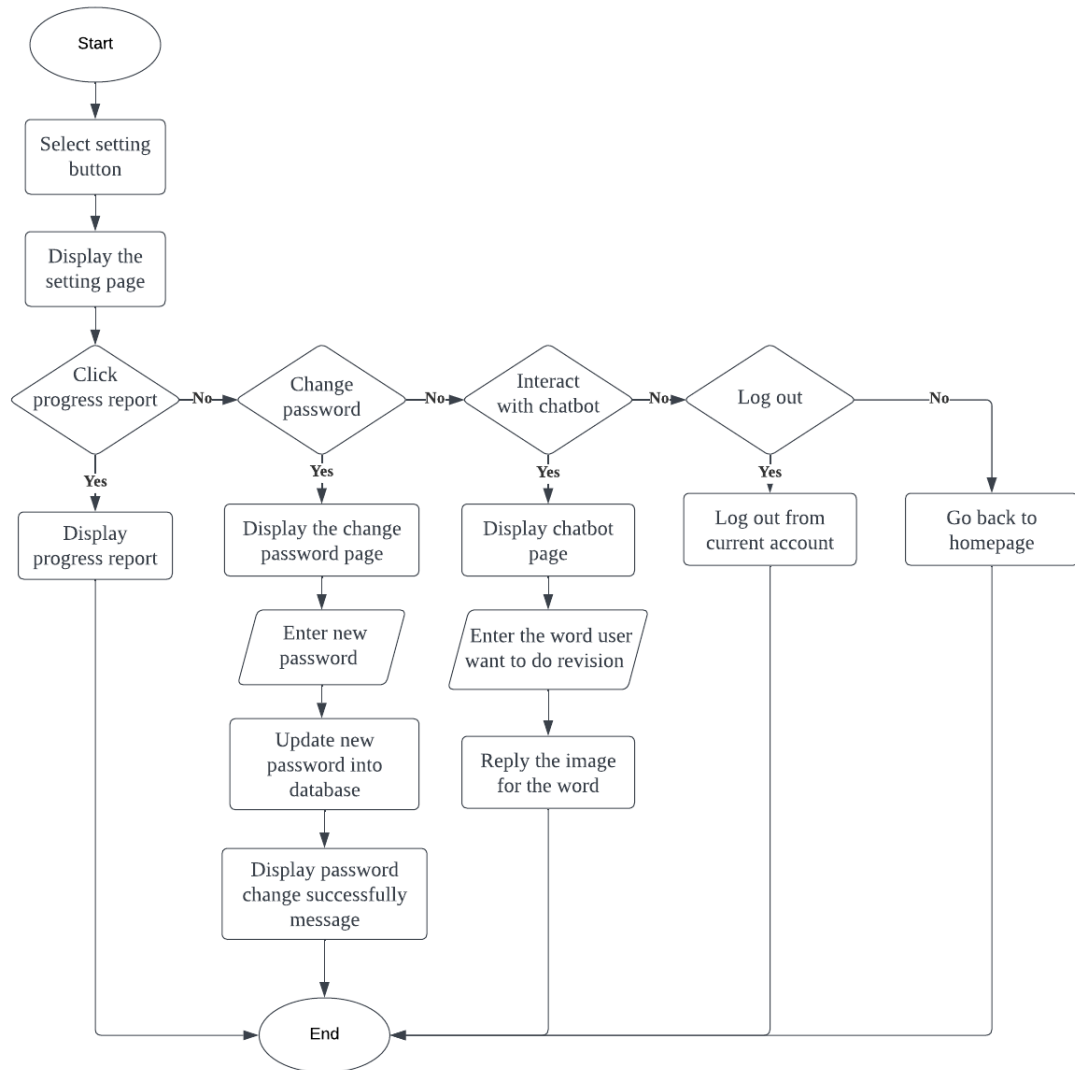


Figure 4.2.6 Setting flow chart diagram

Figure 4.2.6 shows the setting flow chart diagram. When user wants to go to setting page, they can select the setting button. Then system will show the setting page for the. It includes many functions inside, which are progress report, change password, and log out. If user click the progress report button, system will display the progress report for user. If user choose to change password, system will display the change password page to user. Then, user can enter the new password. System will update the new password into the database and show the password

successfully change to user. Besides, user can interact with the predefined rule chatbot to do revision by clicking into the chatbot button. User can enter the word they want and send, then system will reply with the image of the word user sent. In addition, if user choose to log out, system will log out the user from the current account.

4.3 Timeline

Project Task	Week													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Implementation														
Review and refine FYP1 report	█													
Improve the login page		█												
Develop the Quiz for English and Math			█	█										
Develop the setting module					█									
Develop the modules inside setting page						█	█							
Solve the error								█						
Improve the UI and finalize the system									█					
Testing														
Test and evaluate the system										█				
Create the google form for user evaluation										█				
Collect the result and analyse the result											█			
Documentation		█	█	█	█	█	█	█	█	█	█	█		
Submission of FYP2													█	
Presentation													█	█

Figure 4.3 Gantt Chart of FYP2

Figure 4.3 shows the Gantt Chart of FYP2, it includes all the schedule in this 14 week. For Implementation part, reviewing and refining of the FYP1 report will be carried out in week 1. In week 2, the login page needs some improvement. In week 3 and week 4, the Quiz functions of English and Math subjects are planned to be developed. After finishing the Quiz functions, setting module is developed in week 5 and the modules inside will be created in week 6 and week 7. After developing most of the important functions, the errors need to be solved in week 8. Then, in week 9, the user interfaces are improved, and the system is finalized. In testing and evaluation part, developer tests and evaluates the system in week 10. After testing, the google form is created for user to collect the result of evaluation in the same week. In week 11, the results are collected and do analysis with the result. In addition, documentation process is start from week 2 until week 12. This FYP2 report is submitted by week 13 and presentation will be done by week 14.

Chapter 5

System Implementation

5.1 Hardware Setup

The hardware involved in this project is computer and android mobile device.

Table 5.1 Specifications of laptop

Description	Specifications
Model	Acer Nitro 5
Processor	AMD Ryzen 7 3750H with Radeon Vega Mobile Gfx 2.30 GHz
Operating System	Windows 10
Graphic	NVIDIA GeForce GTX 1650
Memory	12.0 GB
Storage	1TB SATA HDD

5.2 Software Setup

The software that I will use in this project is Android Studio. Android Studio is suitable for android devices. Android Studio able to speed up development and assist in creating the best apps for all Android devices [12]. Besides, it enables developer to change the code quickly without restarting the application [12]. It supports the firebase database. Besides, build automation, dependency management, and customised build configurations are provided by Android Studio to help the developers [13].

5.3 Setting and Configuration

```
android {
    namespace 'com.example.kidseducational'
    compileSdk 33

    defaultConfig {
        applicationId "com.example.kidseducational"
        minSdk 33
        targetSdk 33
        versionCode 1
        versionName "1.0"

        testInstrumentationRunner "androidx.test.runner.AndroidJUnitRunner"
    }
}
```

Figure 5.1 Default Configuration

Figure 5.1 shows the minimum and target SDK version needed to run this application is 33. Android device with SDK version 33 or above can ensure the performance of the application performed effectively. If the SDK version is lower than 33 may cause the installation fail.

```
dependencies {
    implementation 'androidx.appcompat:appcompat:1.6.1'
    implementation 'com.google.android.material:material:1.5.0'
    implementation 'androidx.constraintlayout:constraintlayout:2.1.4'
    implementation 'com.google.firebase:firebase-auth:21.1.0'
    implementation 'com.google.firebase:firebase-database:20.1.0'
    testImplementation 'junit:junit:4.13.2'
    androidTestImplementation 'androidx.test.ext:junit:1.1.5'
    androidTestImplementation 'androidx.test.espresso:espresso-core:3.5.1'
    implementation 'pl.droidsonroids.gif:android-gif-drawable:1.2.23'
```

Figure 5.2 Dependencies in Build Gradle (app)

Figure 5.2 shows all the dependencies required in this application.

5.4 System Operation(with Screenshot)

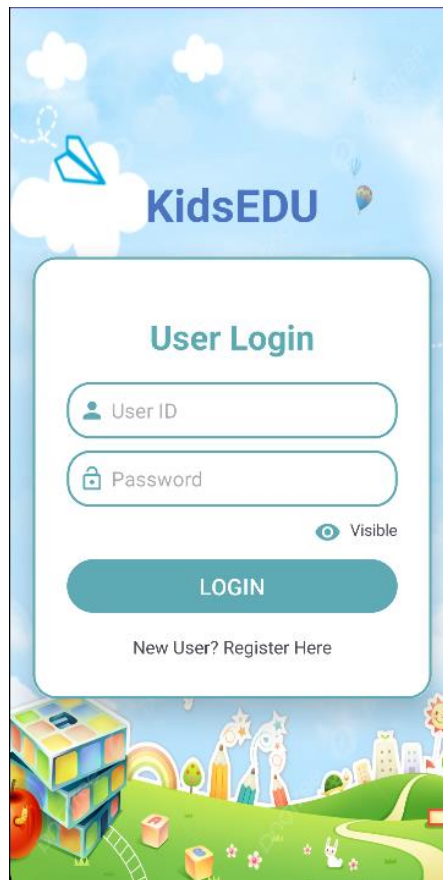


Figure 5.3 Login page

Figure 5.3 shows the login page of this kids educational and entertainment mobile application. When user click into the application, the first interface is this login page. If user already has account, user can fill in the user id (Gmail) and correct password to login in. There is a button that allows users to view the password entered to check for the correctness, because the password set as hidden by default. System will check all the data entered by user are correct through Firebase authentication. If correct, system will show a toast to inform user login successfully and system will navigate user to home page.

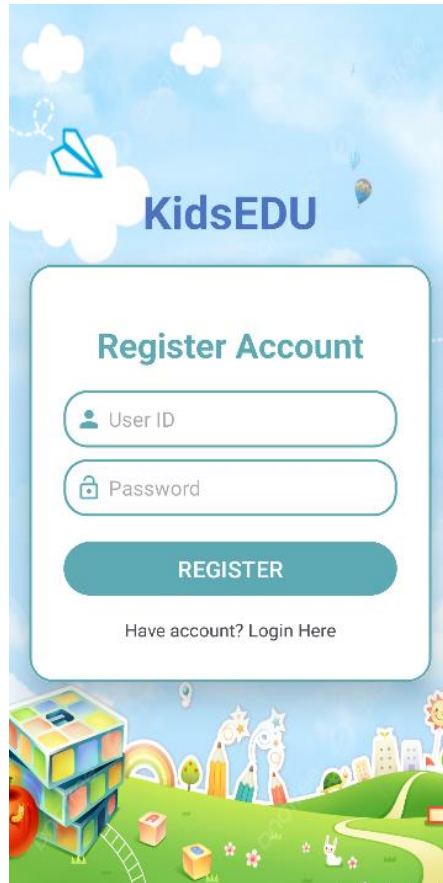


Figure 5.4 User registration page

Figure 5.4 shows the user registration page. If user is new to this application or user wants to create another new user account, user can click the “New User? Register Here” word in login page. Then, system will navigate user to this registration page to create new account. After creating the account, system will navigate user to login page to login their account.



Figure 5.5 Home page

Figure 5.5 shows the home page of this application. It consists of four main functions which are English subject, Math subject, Coloring, and Drawing. User can select the function by clicking the gif image or the word. There is a setting button in the top right corner.



Figure 5.6 English main page

Figure 5.6 shows the English main page of this application. In this page, there are two main functions, which are lesson and quiz. Lesson function is for user to learn the English alphabets and words. Quiz function if for user to test their understanding, it is similar to mini test.



Figure 5.7 English lessons page

Figure 5.7 shows English lessons page. It includes all the alphabets from A to Z. User can scroll to find the alphabet they want to learn. When user click into the alphabet card, system will play the sound of the alphabet to teach user.



Figure 5.8 Alphabet page

After selecting the alphabet in Figure 5.7, system will bring user to this alphabet page. In this page, user can click the alphabet image or gif to get the sound of the alphabet. In the bottom of the page, there are five words for each alphabet page, these five words are card view in which user can press on it and get the pronunciation of the word. It can help in better understanding and learning for kids. This is because it is more attractive to them and it is a more interactive learning way.

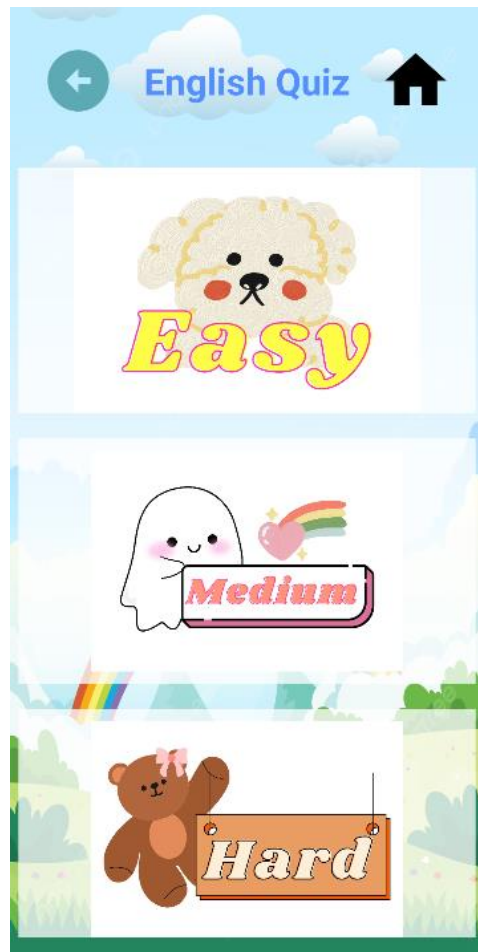


Figure 5.9 English quiz page

Figure 5.9 shows the English quiz page. For English subject, it includes three different difficulty modes which are easy, medium, and hard. Each quiz mode has different test method and has different time for each question. In addition, all modes have five questions for each test. This is because five questions are sufficient for a quick test. If there are a lot questions, it may cause user to feel bored when they do the quiz.

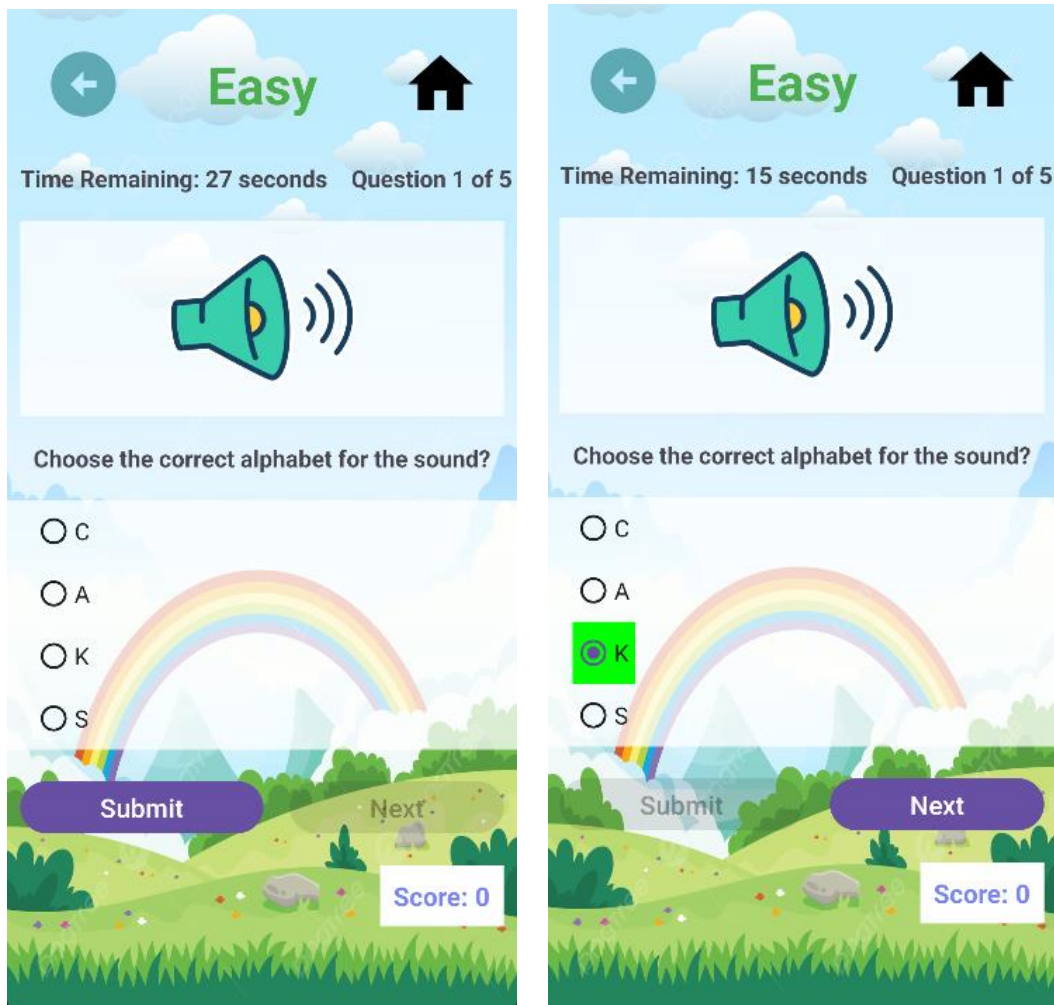


Figure 5.10 English quiz easy mode

Figure 5.10 shows the English quiz in easy mode, user has 30 seconds to answer each question. For easy mode, the question will randomly display the sound of the alphabet, and it will provide a list of answer choices for user to select. After submitting the answer, the system will check the correctness of the answer selected. If it is correct, the system will turn the answer button to green highlight. Besides, user can also click the audio button to play again the sound of the question.



Figure 5.11 Result page for English quiz

Figure 5.11 shows the result page for English quiz. After user answer all the questions of the quiz, system will display this result page to user. This result page shows the mode of the quiz taken, the score and the date time of this quiz taken. User can click the “Take Quiz Again”, system will navigate user to the Figure 5.9 English Quiz page for user to choose the quiz mode. After finishing the quiz, the data will store inside the Firebase real time database.

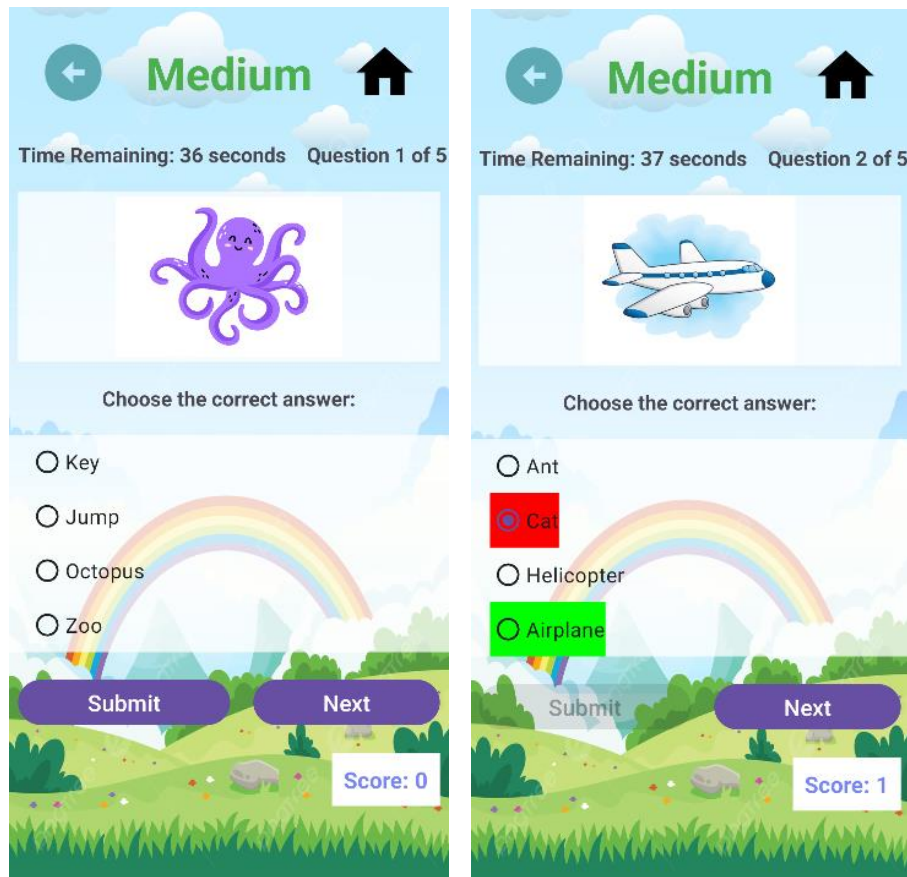


Figure 5.12 English quiz medium mode

Figure 5.12 shows the English quiz in medium mode. This difficulty mode provides user 40 seconds to answer each question. The question will show the image of the word, then provide a list of words for user to choose. If user select the wrong answer, then system will turn the answer chosen by user turn to red highlight. The correct answer will be displayed as green highlight to inform user the correct answer. It can help user to learn effectively because user do not need to find back the lessons for that word.

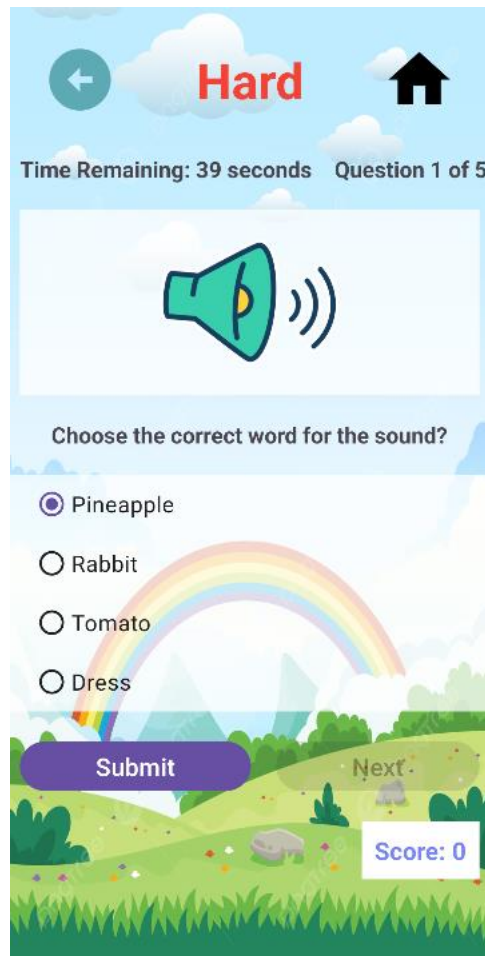


Figure 5.13 English quiz hard mode

Figure 5.13 shows the English quiz in hard mode. This mode provides user 45 seconds to answer each question. Question will play the sound of the word and show a list of words for user to choose. If user wants to listen the question again, they can click the audio image button.



Figure 5.14 Math main page

Figure 5.14 shows Math subject main page. There are two main functions included in this page which are lesson and quiz. User can learn Math through the lesson function and user can test their understanding through quiz function.



Figure 5.15 Math lessons page

Figure 5.15 shows the math lessons page. There is number one to ten with the word and picture to teach user. When user click the number, it will play the sound of the number.



Figure 5.16 Math quiz page

Figure 5.16 shows Math quiz page, it includes two difficulty modes which are addition and subtraction. User can select the quiz mode they want by clicking the image. Both difficulty modes have five questions for each test.

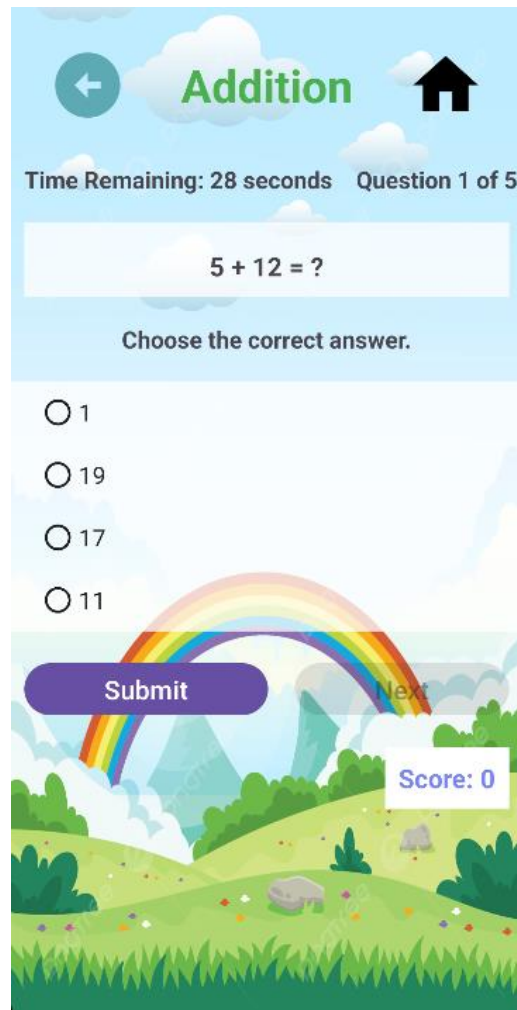


Figure 5.17 Math quiz addition mode

Figure 5.17 shows Math quiz addition mode. User has 30 seconds to answer each question. System will randomly select the number from the range set in question, system will also randomly generate a list of answer choices with possible answers for each question. It will work as the English quiz mode in which system will shows the correct answer in green highlight and wrong answer in red highlight.



Figure 5.18 Math result page

After answering five questions in Figure 5.17, system will display the Math score page for user. In this page, it will show the difficulty mode, score, and date time of the quiz taken. These data also recorded in the Firebase Real Time Database for the user account.

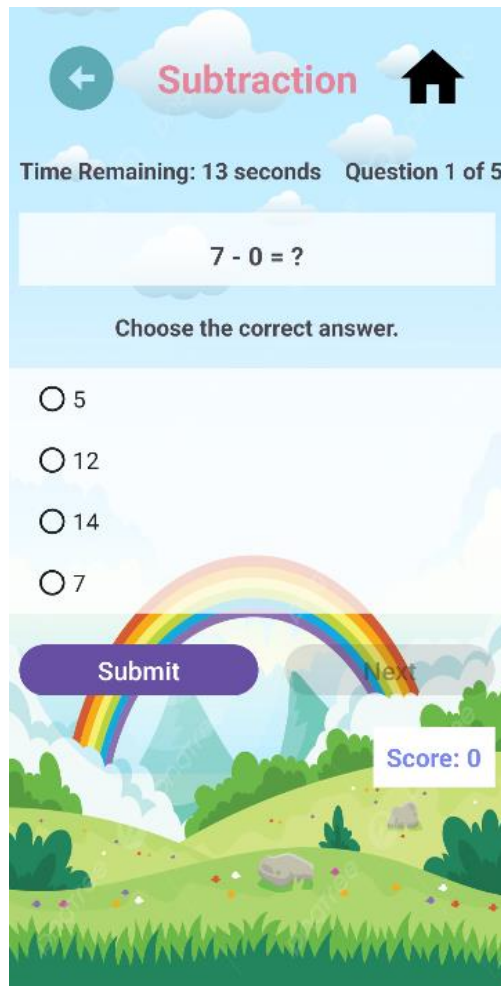


Figure 5.19 Math quiz subtraction mode

Figure 5.19 shows the Math quiz subtraction mode. This mode provides 30 seconds to answer each question. In this subtraction mode, system will randomly generate the number from the range set in the question, then it will generate a list of answer choices for user to choose.

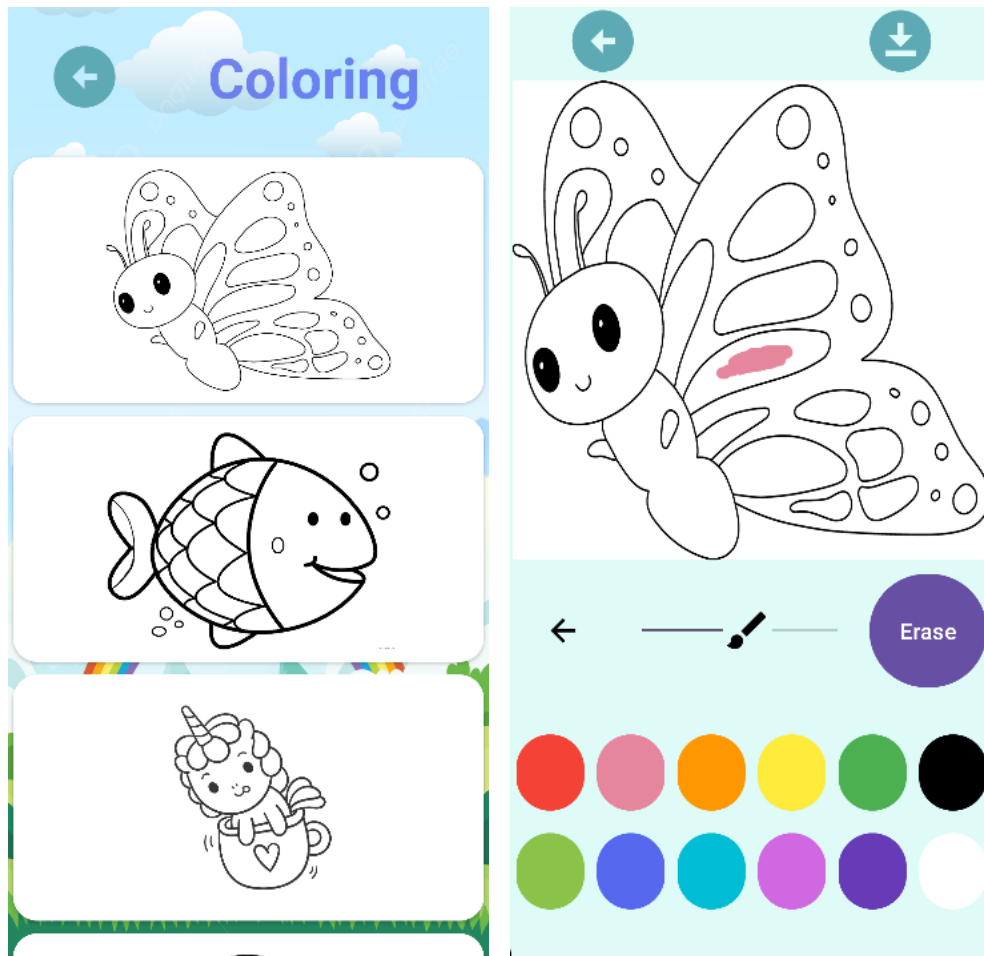


Figure 5.20 Coloring main page & Coloring page

Figure 5.20 shows the coloring page. When user click the coloring function in home page, then system will display the pictures for user to select. After clicking into the picture, then system will navigate user to the color page. In this page, user can select the color they want and adjust the brush size. When user wants to remove all the color on the picture, they can click the erase button. If user only wants to undo the last action they made, they can click the back button which places on the left side of the brush size editor. There is a save button in the top right corner, the picture will be saved in the image gallery of user own device.



Figure 5.21 Drawing page

Figure 5.21 shows the drawing page. In this page, user can adjust the brush size and choose the color they want to draw. Then, it also have the erase button to clear all the drawing and the undo button to remove the last drawing. User can save the picture they draw by clicking on the save button, then the picture will save inside their own image gallery in the device.

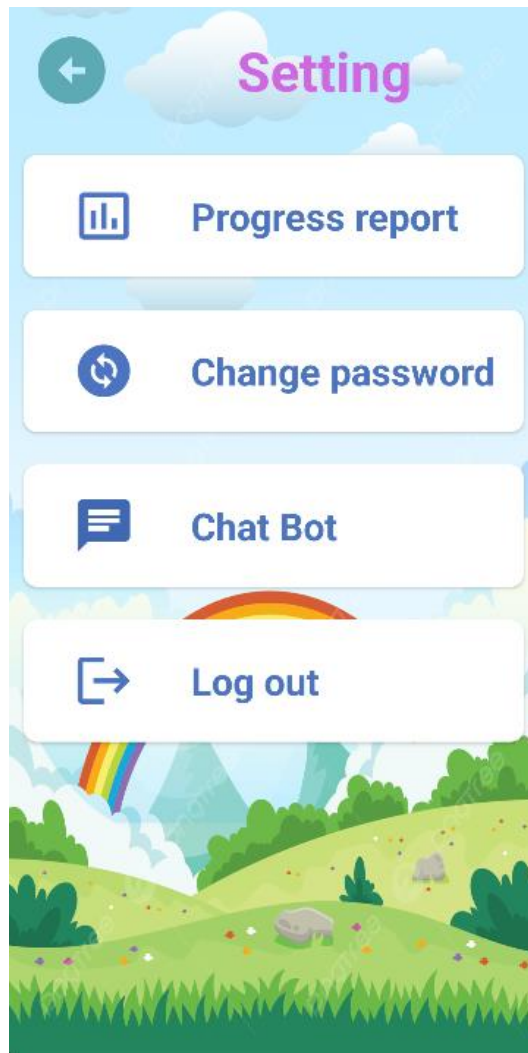


Figure 5.22 Setting page

Figure 5.22 shows the setting page of the application. After clicking the setting button on the homepage, then system will navigate user to this page. In this page, there are many functions which are progress report, change password, chatbot, and logout. After clicking log out button, then user will go back to the login page.

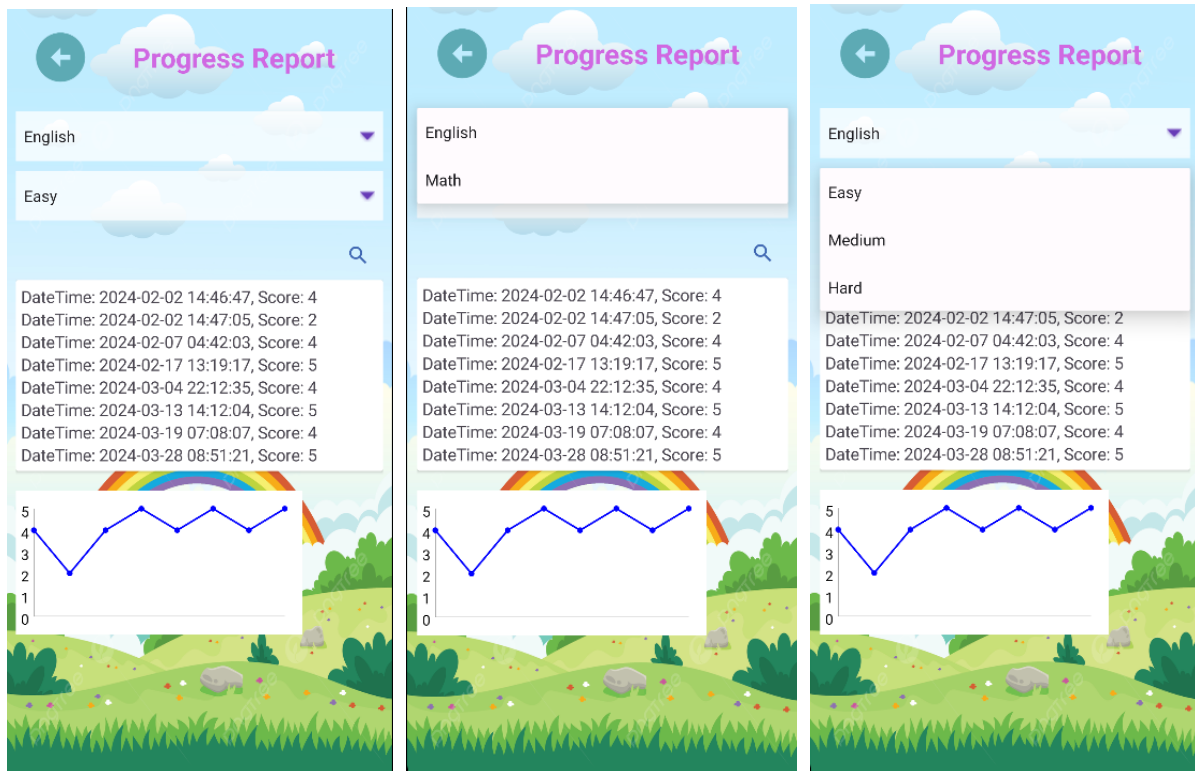


Figure 5.23 Progress report page

Figure 5.23 shows the progress report page. After clicking the progress report button on the setting page (Figure 5.22), then user can view the progress report. When user click into this progress report page, all the data regarding to the English easy mode will be shown by default. The data includes the date time and the scores. There is also a graph that shows the performance of user for this subject's difficulty mode. User can know their performance is become better or downgrading over time. Then, user can select other difficulty mode or change the subject to view the report. For English subject, the modes are "Easy", "Medium", and "Hard". For Math subject, the modes are "Addition" and "Subtraction". User can change the subject and mode, then click the search button to view the report.

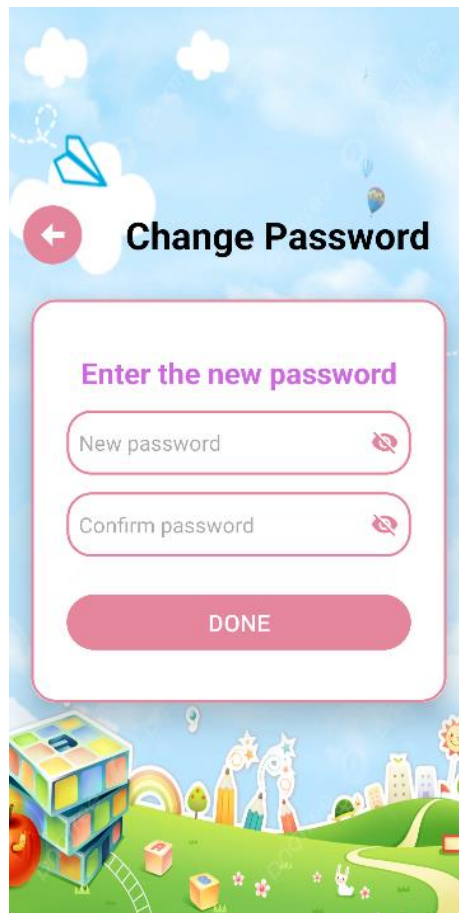


Figure 5.24 Change password page

When user click the change password button on the setting page, then system will navigate user this page. User can enter the new password they want to change. They can click the unhidden button to make the password entered become visible. After submitting the password, then the new password will be updated in the Firebase.

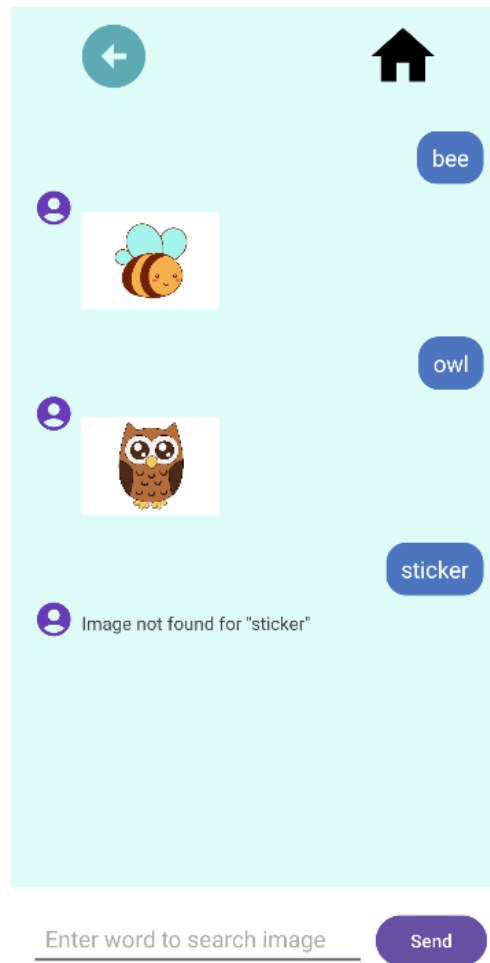


Figure 5.25 Chatbot page

Figure 5.25 shows the chatbot page. This chatbot is a rule-based chat bot. User can use this function as a revision by sending the word they want, then the system will find the image and display to user. This function allows users to do revision more efficiently and effectively because user do not need to find the word manually in the lessons page.

5.5 Implementation Issues and Challenges

One of the challenges is the progress report is not able to display all the date time in the graph because the format of date time is long. If the graph includes the date time, it will cause the graph looked complicated. Therefore, the date and time are not included in the graph section. However, all the date time and scores are listed above the graph. So, user can refer to the data above to know their performance over time. Besides, the graph shows the scores and displays each point with a dot according to the date time. So, user can know their quiz performance is better or worsen.

5.6 Concluding Remark

In summary, this chapter includes the explanation of the hardware setup, software setup, and setting that are required to run this kids' educational and entertainment mobile application. Furthermore, this chapter also includes the system operation with the screenshots, it is work as a user manual to teach user how to interact with the application. Lastly, the challenges and issues when implementation this project is the progress report is not able to display all the date and time for each quiz. This is because it will make the graph to become too complex and hard to understand by user.

Chapter 6

System Evaluation And Discussion

6.1 System Testing and Performance Metrics

This part is alpha testing in which developer tests the application before release the application for external user. The purpose of conducting this alpha testing is to get the actual result and compared it with the expected result. Alpha testing is also used to ensure the application meets the requirements.

6.1.1 Test Cases for Login Page

No.	Test Case Description	Test Data	Expected Result	Actual Result	Pass/Fail
1	Check the response when user click the “New User? Register Here” button.	Click the “New User? Register Here” button	The system should navigate user to the registration page.	The system navigate user to the registration page successfully.	Pass
2	Check the response when user click the visible button for the password text view.	Click the visible button below the password text view.	The password should become visible, and the visible button change to hidden button.	The password become visible, and the visible button change to hidden button successfully.	Pass
3	Check the response when user click the hidden button for the password text view.	Click the hidden button below the password text view.	The password should become hidden, and the hidden button change to visible button.	The password become hidden, and the hidden button changed to visible button successfully.	Pass
4	Check the response when user does not enter the correct user id or password.	Enter the wrong user id or password and click the login button.	The system should show the “Login Failed” message.	The system shows the “Login Failed” message to user successfully.	Pass
5	Check the response when user does not fill in the user id or password.	Leave the user id or password blank and click the login button.	The system should alert the user to fill in the user id or password.	The system alerts the user to fill in the user id or password successfully.	Pass

6	Check the response when user enter the user id and password correctly.	Enter the correct user id and password and click the login button.	The system should show a message “Login Successful” to inform user and navigate user to home page.	The system shows “Login Successful” message to user and navigate user to home page successfully.	Pass
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6.1.2 Test Case for Register Page

No.	Test Case Description	Test Data	Expected Result	Actual Result	Pass/Fail
1	Check the response when user click the “Have account? Login Here” button.	Click the “Have account? Login Here” button.	The system should navigate user to login page to login their user account.	The system navigates user to login page to login their account.	Pass
2	Check the response when user does not fill in the user id or password.	Leave the user id or password blank and click the register button.	The system should show error or alert user to fill in the user id or password.	The system shows error to tell user to fill in the user id or password successfully.	Pass
3	Check the response when user enter the user id and password, then click register.	Enter the user id and password and click the register button.	The system should show a toast message “Register Successfully” to inform user and navigate user to Login page.	The system shows a toast message “Register Successfully” to inform user and navigates user to Login page successfully.	Pass

6.1.3 Test Case for Home Page

No.	Test Case Description	Test Data	Expected Result	Actual Result	Pass/Fail
1	Check all the GIF images are working.	After login to home page, observe the GIF images.	All the GIF images of English, Math, Coloring, and Drawing are working.	All the GIF images of English, Math, Coloring, and Drawing are working well.	Pass

2	Check the response when user click the “English” subject function.	Click the “English” image button.	The system should navigate user to English main page.	The system navigates user to English main page successfully.	Pass
3	Check the response when user click the “Math” subject function.	Click the “Math” image button.	The system should navigate user to Math main page.	The system brings user to Math main page successfully.	Pass
4	Check the response when user click the “Coloring” function.	Click the “Coloring” image button.	The system should navigate user to the Coloring main page.	The system navigates user to the Coloring main page successfully.	Pass
5	Check the response when user click the “Drawing” function.	Click the “Drawing” image button.	The system should bring user to the Drawing page.	The system brings user to the Drawing page successfully.	Pass
5	Check the response when user click setting button.	Click the setting button on the top right corner of home page.	The system should show the setting page.	The system shows the setting page to user successfully.	Pass

6.1.4 Test Case for English Main Page

No.	Test Case Description	Test Data	Expected Result	Actual Result	Pass/Fail
1	Check all the GIF images are working.	After click into English main page, observe the GIF images.	The GIF images of lesson and quiz are working.	The GIF images of lesson and quiz are working well.	Pass
2	Check the response when user click the “Lesson” function.	Click the “Lesson” image button.	The system should bring user to the English lessons page.	The system navigates user to the English lessons page successfully.	Pass
3	Check the response when user click the “Quiz” function.	Click the “Quiz” image button.	The system should navigate user to the English quiz page.	The system navigates user to the English quiz page successfully.	Pass

4	Check the response when user click the exit button.	Click the exit button in the top left corner of English main page.	The system should bring user go back to the home page.	The system brings user go back to home page successfully.	Pass
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6.1.5 Test Case for English Lessons Page

No.	Test Case Description	Test Data	Expected Result	Actual Result	Pass/Fail
1	Check the response when user click the alphabet card view.	Click the alphabet card view.	The system should play the sound of the alphabet and show the alphabet page at the same time.	The system plays the sound of the alphabet and shows the alphabet page at the same time successfully.	Pass
2	Check the response when user click the exit button.	Click the exit button on the top left corner of the English lessons page.	The system should bring user back to the English main page.	The system navigates user go back to the English main page successfully.	Pass
3	Check the response when user click the home button.	Click the home button on the top right corner of the English lessons page.	The system should bring user back to home page.	The system brings user back to the home page successfully.	Pass

6.1.6 Test Case for Alphabet Pages

No.	Test Case Description	Test Data	Expected Result	Actual Result	Pass/Fail
1	Check the responses when user click the alphabet image.	Click the alphabet image.	The system should play the sound of the alphabet.	The system plays the sound of the alphabet successfully.	Pass
2	Check the responses when user click the GIF image of alphabet.	Click the GIF image of alphabet.	The system should play the sound of the alphabet.	The system plays the sound of the alphabet successfully.	Pass

3	Check the sound of the words are played when the word card views are clicked.	Click the word card view.	The system should play the sound of the word.	The system plays the sound of the word successfully.	Pass
4	Check the response when user click the exit button.	Click the exit button on the top left corner of the Alphabet page.	The system should bring user back to the English lessons page.	The system brings user back to the English lessons page successfully.	Pass
5	Check the response when user click the home button.	Click the home button on the top right corner of the Alphabet page.	The system should bring user back to home page.	The system brings user back to the home page successfully.	Pass

6.1.7 Test Case for English Quiz Page

No.	Test Case Description	Test Data	Expected Result	Actual Result	Pass/ Fail
1	Check the response when user click the “Easy” mode.	Click the “Easy” image view.	The system will navigate user to the English Quiz Easy Mode page.	The system navigates user to the English Quiz Easy Mode page successfully.	Pass
2	Check the response when user click the “Medium” mode.	Click the “Medium” image view.	The system will navigate user to the English Quiz Medium Mode page.	The system navigates user to the English Quiz Medium Mode page successfully.	Pass
3	Check the response when user click the “Hard” mode.	Click the “Hard” image view.	The system will navigate user to the English Quiz Hard Mode page.	The system brings user to the English Quiz Hard Mode page successfully.	Pass
4	Check the response when user click the exit button.	Click the exit button on the top left corner of the English Quiz page.	The system should bring user back to the English main page.	The system navigates user back to the English main page successfully.	Pass

5	Check the response when user click the home button.	Click the home button on the top right corner of the English Quiz page.	The system should bring user back to home page.	The system brings user back to the home page successfully.	Pass
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6.1.8 Test Case for English Quiz Easy Mode

No.	Test Case Description	Test Data	Expected Result	Actual Result	Pass/Fail
1	Check the time counting is working when user click into this page to start the quiz.	Observe the timer is counting from 30 seconds.	The timer is counting from 30 seconds.	The timer is working, and it is start counting from 30 seconds.	Pass
2	Check the audio file of the question is played when user enter the quiz page.	Observe whether there is audio file play when user click into the quiz or new question.	The question should randomly select a question and play the sound of the alphabet automatically.	The question randomly selects a question and play the sound of the alphabet automatically.	Pass
3	Check the response of the timer when user selected the answer choice and click the submit button.	Select the answer choice and click submit button. Then, observe the timer.	The timer should stop counting when user click the submit button.	The timer is stop counting when user click the submit button.	Pass
4	Check the response when user selected the correct answer choice.	Select the correct answer choice and click submit button.	The answer choice selected should turn to green highlight.	The answer choice selected turn to green highlight.	Pass
5	Check the response when user selected the wrong answer choice.	Select the wrong answer choice and click submit button.	The answer choice selected should turn to red highlight. At the same time, the system should highlight the correct answer in green highlight to let user	The answer choice selected turn to red highlight. At the same time, the system highlight the correct answer in green highlight successfully.	Pass

			know the correct answer is which one.		
6	Check the response of the score when user answer the question correctly.	Select the answer choice and click submit button.	The system should add one mark to the score if the answer is correct. If the answer is wrong, then it will no changes for the score.	The system add one mark to the score when user answer correctly. If the answer selected is wrong, then the score does not add one mark.	Pass
7	Check the audio button is working when user click the audio button on question.	Click the audio button to play the sound again.	The system should play the sound of the alphabet.	The system plays the sound of the alphabet successfully.	Pass
8	Check the response when user click the exit button.	Click the exit button on the top left corner of the English Quiz Easy page.	The system should bring user back to the English Quiz page.	The system brings user back to the English Quiz page successfully.	Pass
9	Check the response when user click the home button.	Click the home button on the top right corner of the English Quiz Easy page.	The system should bring user back to home page.	The system brings user back to home page successfully.	Pass
10	The response when the timer count to 0 second.	Wait and do nothing to let the timer count to 0.	The system should directly switch to next question.	The system switches to next question directly.	Pass
11	The response when user answer all questions of the quiz.	Answer all five questions.	The system should bring user to the English Score Page.	The system brings user to the English Score Page successfully.	Pass

6.1.9 Test Case for English Quiz Medium Mode

No.	Test Case Description	Test Data	Expected Result	Actual Result	Pass/Fail
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1	Check the time counting is working when user click into this page to start the quiz.	Observe the timer is counting from 40 seconds.	The timer is counting from 40 seconds.	The timer is working, and it is start counting from 40 seconds.	Pass
2	Check the image file of the question is shown when user enter the quiz page.	Observe whether there is image file shown in the question.	The question should randomly select an image file and show to user in the question.	The question randomly selects an image file and shows to user in the question successfully.	Pass
3	Check the response of the timer when user selected the answer choice and click the submit button.	Select the answer choice and click submit button. Then, observe the timer.	The timer should stop counting when user click the submit button.	The timer stops counting when user click the submit button.	Pass
4	Check the response when user selected the correct answer choice.	Select the correct answer choice and click submit button.	The answer choice selected should turn to green highlight.	The answer choice selected turns to green highlight.	Pass
5	Check the response when user selected the wrong answer choice.	Select the wrong answer choice and click submit button.	The answer choice selected should turn to red highlight. At the same time, the system should highlight the correct answer in green color to let user know the correct answer is which one.	The answer choice selected turns to red highlight. At the same time, the system highlights the correct answer in green color successfully.	Pass
6	Check the response of the score when user answer the question correctly.	Select the answer choice and click submit button.	The system should add one mark to the score if the answer is correct. If the answer is wrong, then it will no changes for the score.	The system adds one mark to the score when the answer selected by user is correct. If the answer is wrong, then the system does	Pass

				not add mark into the score.	
7	Check the response when user click the exit button.	Click the exit button on the top left corner of the English Quiz Medium page.	The system should bring user back to the English Quiz page.	The system brings user back to the English Quiz page successfully.	Pass
8	Check the response when user click the home button.	Click the home button on the top right corner of the English Quiz Medium page.	The system should bring user back to home page.	The system brings user back to the home page successfully.	Pass
9	The response when the timer count to 0 second.	Wait and do nothing to let the timer count to 0.	The system should directly switch to next question.	The system switches to the next question directly.	Pass
10	The response when user answer all questions of the quiz.	Answer all five questions.	The system should bring user to the English Score page.	The system navigates user to the English Score page.	Pass

6.1.10 Test Case for English Hard Mode

No.	Test Case Description	Test Data	Expected Result	Actual Result	Pass/Fail
1	Check the time counting is working when user click into this page to start the quiz.	Observe the timer is counting from 45 seconds.	The timer should count from 45 seconds.	The timer is working, and it is start counting from 45 seconds.	Pass
2	Check the audio file of the question is played when user enter the quiz page.	Observe whether there is audio file play when user click into the quiz or new question.	The question should randomly select a question and play the sound of the word automatically.	The question randomly selects a question and automatically play the sound of the word successfully.	Pass
3	Check the response of the timer when user selected the answer	Select the answer choice and click submit button.	The timer should stop counting when	The timer stops counting when user	Pass

	choice and click the submit button.	Then, observe the timer.	user click the submit button.	click the submit button.	
4	Check the response when user selected the correct answer choice.	Select the correct answer choice and click submit button.	The answer choice selected should turn to green highlight.	The answer choice selected turn to green highlight successfully.	Pass
5	Check the response when user selected the wrong answer choice.	Select the wrong answer choice and click submit button.	The answer choice selected should turn to red highlight. At the same time, the system should highlight the correct answer into green color to let user know the correct answer is which one.	The answer choice selected turn to red highlight successfully. At the same time, the system highlights the correct answer into green color successfully.	Pass
6	Check the response of the score when user answer the question correctly.	Select the answer choice and click submit button.	The system should add one mark to the score if the answer is correct. If the answer is wrong, then it should no changes for the score.	When the answer selected is correct, then the system adds one mark to the score successfully. If not, then system does not add one mark into the score.	Pass
7	Check the audio button is working when user click the audio button on question.	Click the audio button to play the sound again.	The system should play the sound of the word.	The system plays the sound of the word successfully.	Pass
8	Check the response when user click the exit button.	Click the exit button on the top left corner of the English Quiz Hard page.	The system should bring user back to the English Quiz page.	The system brings user back to the English Quiz page successfully.	Pass
9	Check the response when user click the home button.	Click the home button on the top right corner of the	The system should bring user back to home page.	The system navigates user back	Pass

		English Quiz Hard page.		to home page successfully.	
10	The response when the timer count to 0 second.	Wait and do nothing to let the timer count to 0.	The system should directly switch to next question.	The system switches to the next question directly.	Pass
11	The response when user answer all questions of the quiz.	Answer all five questions.	The system should bring user to the English Score page.	The system navigates user to the English Score page successfully.	Pass

6.1.11 Test Case for English Score Page

No.	Test Case Description	Test Data	Expected Result	Actual Result	Pass/Fail
1	Check the GIF image is working.	Observe the GIF image.	The GIF image should be worked.	The GIF image is working.	Pass
2	Check the mode of the quiz is specified.	Observe the mode of the quiz after answering all the questions and enter this score page.	The system should show the mode correctly for the quiz taken.	The system successfully shows the mode correctly for the quiz taken.	Pass
3	Check the score of the quiz is shown.	Observe the score written.	The system should show the score correctly for the quiz taken.	The system successfully displays the score correctly for the quiz taken.	Pass
4	Check the user id (Gmail) of user is shown.	Observe the user id on top part of the screen.	The system should retrieve the user id and display on the score page.	The system retrieves the user id and display on the score page successfully.	Pass
5	Check the date time of the quiz taken is shown.	Observe the date time of the quiz on the screen.	The system should show the date and time of the quiz taken.	The system displays the date and time of the quiz taken to user successfully.	Pass

6	Check the response when user click the “Take Quiz Again” button.	Click the “Take Quiz Again” button.	The system should navigate user to the English Quiz page.	The system navigates user to the English Quiz page successfully.	Pass
7	Check the response when user click “Home” button.	Click the “Home” button.	The system should bring user to the home page.	The system brings user to home page successfully.	Pass

6.1.12 Test Case for Math Main Page

No.	Test Case Description	Test Data	Expected Result	Actual Result	Pass/Fail
1	Check all the GIF images are working properly.	After click into Math main page, observe the GIF images.	The GIF images of lesson and quiz are working.	The GIF images of lesson and quiz are working.	Pass
2	Check the response when user click the “Lesson” function.	Click the “Lesson” image button.	The system should bring user to the Math Lessons page.	The system brings user to the Math Lessons page successfully.	Pass
3	Check the response when user click the “Quiz” function.	Click the “Quiz” image button.	The system should navigate user to the Math Quiz page.	The system navigates user to the Math Quiz page successfully.	Pass
4	Check the response when user click the exit button.	Click the exit button in the top left corner of Math main page.	The system should bring user go back to the home page.	The system brings user back to the home page successfully.	Pass

6.1.13 Test Case for Math Lessons Page

No.	Test Case Description	Test Data	Expected Result	Actual Result	Pass/Fail
1	Check the response when user click the number or image of the specific number.	Click the number or the image of the specific number.	The system should play the sound of the number.	The system plays the sound of the number successfully.	Pass

2	Check the response when user click the exit button.	Click the exit button on the top left corner of the Math lessons Page.	The system should bring user back to the Math main page.	The system brings user back to the Math main page successfully.	Pass
3	Check the response when user click the home button.	Click the home button on the top right corner of the Math lessons Page.	The system should bring user back to the main page.	The system navigates user back to the main page successfully.	Pass

6.1.14 Test Case for Math Quiz Page

No.	Test Case Description	Test Data	Expected Result	Actual Result	Pass/ Fail
1	Check the response when user click the “Addition” mode.	Click the “Addition” image view.	The system should navigate user to the Math Quiz Addition Mode page.	The system navigates user to the Math Quiz Addition Mode page successfully.	Pass
2	Check the response when user click the “Subtraction” mode.	Click the “Subtraction” image view.	The system should navigate user to the Math Quiz Subtraction Mode page.	The system navigates user to the Math Quiz Subtraction Mode page successfully.	Pass
3	Check the response when user click the exit button.	Click the exit button on the top left corner of the Math Quiz page.	The system should bring user back to the Math main page.	The system brings user back to the Math main page successfully.	Pass
4	Check the response when user click the home button.	Click the home button on the top right corner of the Math Quiz page.	The system should bring user back to home page.	The system brings user back to home page successfully.	Pass

6.1.15 Test Case for Math Quiz Addition Mode

No.	Test Case Description	Test Data	Expected Result	Actual Result	Pass/Fail
1	Check the time counting is working when user click into this page to start the quiz.	Observe the timer is counting from 30 seconds.	The timer is counting properly from 30 seconds.	The timer is working successfully, and it is start counting from 30 seconds.	Pass
2	Check the question is randomly generate the number within the range set and generate a list of answer choices.	Observe whether there are numbers shown in the question.	The question should randomly generate the numbers within the range set and a list of answer choices to user in the question.	The question randomly generates the numbers within the range set and generates a list of answer choices to user in the question successfully.	Pass
3	Check the response of the timer when user selected the answer choice and click the submit button.	Select the answer choice and click submit button. Then, observe the timer.	The timer should stop counting when user click the submit button.	The timer stop counting successfully when user click the submit button.	Pass
4	Check the response when user selected the correct answer choice.	Select the correct answer choice and click submit button.	The answer choice selected should turn to green highlight.	The answer choice selected turn to green highlight successfully.	Pass
5	Check the response when user selected the wrong answer choice.	Select the wrong answer choice and click submit button.	The answer choice selected should turn to red highlight. At the same time, the system should highlight the correct answer in green highlight to let user know the correct answer is which one.	The answer choice selected turn to red highlight. At the same time, the system highlights the correct answer in green color successfully.	Pass

6	Check the response of the score when user answer the question correctly.	Select the answer choice and click submit button.	The system will add one mark to the score if the answer is correct. If the answer is wrong, then it will no changes for the score.	When the answer is correct, the system adds one mark to the score successfully. If the answer is wrong, the system does not add one mark into the score.	Pass
7	Check the response when user click the exit button.	Click the exit button on the top left corner of the Math Quiz Addition page.	The system should bring user back to the Math Quiz page.	The system brings user back to the Math Quiz page successfully.	Pass
8	Check the response when user click the home button.	Click the home button on the top right corner of the Math Quiz Addition page	The system should bring user back to home page.	The system navigates user back to home page successfully.	Pass
9	The response when the timer count to 0 second.	Wait and do nothing to let the timer count to 0.	The system should display the correct answer in red highlight.	The system displays the correct answer in red highlight.	Pass
10	The response when user answer all questions of the quiz.	Answer all five questions.	The system should bring user to the Math Score page.	The system navigates user to the Math Score page successfully.	Pass

6.1.16 Test Case for Math Quiz Subtraction Mode

No.	Test Case Description	Test Data	Expected Result	Actual Result	Pass/Fail
1	Check the time counting is working when user click into this page to start the quiz.	Observe the timer is counting from 30 seconds.	The timer should count from 30 seconds.	The timer is working, and it is start counting from 30 seconds.	Pass
2	Check the question is randomly generate the	Observe whether there are numbers	The question should randomly generate	The question randomly generates	Pass

	number within the range set and generate a list of answer choices.	shown in the question.	the numbers within the range set and a list of answer choices to user in the question.	the numbers within the ranges set and it also generates a list of answer choices to user in the question successfully.	
3	Check the response of the timer when user selected the answer choice and click the submit button.	Select the answer choice and click submit button. Then, observe the timer.	The timer should stop counting when user click the submit button.	The timer is stop counting when user click the submit button.	Pass
4	Check the response when user selected the correct answer choice.	Select the correct answer choice and click submit button.	The answer choice selected should turn to green highlight.	The answer choice selected turns to green highlight.	Pass
5	Check the response when user selected the wrong answer choice.	Select the wrong answer choice and click submit button.	The answer choice selected should turn to red highlight. At the same time, the system should highlight the correct answer in green highlight to let user know the correct answer is which one.	The answer choice selected turns to red highlight. At the same time, the system highlights the correct answer into green color successfully.	Pass
6	Check the response of the score when user answer the question correctly.	Select the answer choice and click submit button.	The system will add one mark to the score if the answer is correct. If the answer is wrong, then it will no changes for the score.	The system adds one mark to the score if the answer is correct. If the answer wrong, the system does not add one mark into the score.	Pass
7	Check the response when user click the exit button.	Click the exit button on the top left corner of the Math Quiz	The system should bring user back to the Math Quiz page.	The system brings user back to the Math Quiz page successfully.	Pass

		Subtraction page.			
8	Check the response when user click the home button.	Click the home button on the top right corner of the Math Quiz Subtraction page	The system should bring user back to home page.	The system brings user back to home page successfully.	Pass
9	The response when the timer count to 0 second.	Wait and do nothing to let the timer count to 0.	The system should turn the answer into red highlight.	The system turns the answer into red highlight.	Pass
10	The response when user answer all questions of the quiz.	Answer all five questions.	The system should bring user to the Math Score page.	The system brings user to the math Score page successfully.	Pass

6.1.17 Test Case for Math Score Page

No.	Test Case Description	Test Data	Expected Result	Actual Result	Pass/Fail
1	Check the GIF image is working.	Observe the GIF image.	The GIF image should be worked.	The GIF image is working.	Pass
2	Check the mode of the quiz is specified.	Observe the mode of the quiz after answering all the questions and enter this score page.	The system should show the mode correctly for the quiz taken.	The system shows the mode correctly for the quiz taken.	Pass
3	Check the score of the quiz is shown.	Observe the score written.	The system should show the score correctly for the quiz taken.	The system shows the score correctly for the quiz taken.	Pass
4	Check the user id (Gmail) of user is shown.	Observe the user id on top part of the screen.	The system should retrieve the user id and display on the score page.	The system retrieves the user id and display on the score page successfully.	Pass

5	Check the date time of the quiz taken is shown.	Observe the date time of the quiz on the screen.	The system should show the date and time of the quiz taken.	The system shows the date and time of the quiz taken.	Pass
6	Check the response when user click the “Take Quiz Again” button.	Click the “Take Quiz Again” button.	The system should navigate user to the Math Quiz page.	The system navigates user to the Math Quiz page successfully.	Pass
7	Check the response when user click “Home” button.	Click the “Home” button.	The system should bring user to the home page.	The system brings user to the home page successfully.	Pass

6.1.18 Test Case for Coloring Main Page

No.	Test Case Description	Test Data	Expected Result	Actual Result	Pass/Fail
1	Check the list of coloring picture are shown.	Observe the pictures on the Coloring Main Page.	The system should display all the coloring pictures for user to choose.	The system shows all the coloring pictures for user to choose.	Pass
2	Check the response when user select the picture.	Click the picture.	The system should bring user to the coloring page of the picture selected.	The system brings user to the coloring page of the picture selected.	Pass
3	Check the response when user click the exit button.	Click the exit button on the top left corner of page.	The system should navigate user to the home page.	The system navigates user to the home page successfully.	Pass

6.1.19 Test Case for Coloring Page

No.	Test Case Description	Test Data	Expected Result	Actual Result	Pass/Fail
1	Check the response when user click the color and paint on the picture.	Click to select the color and paint on the picture.	The system should let user to paint on the picture with the color selected.	The system allows user to paint on the picture with the color selected.	Pass
2	Check the response when user adjust the	Adjust the brush size to the size the	The system should show the color with	The system shows the color with the	Pass

	brush size and paint on the picture.	user wants and paint on the picture.	the brush size user set on the picture.	brush size user set on the picture successfully.	
3	Check the response when user click the undo button.	Click the undo button beside the brush size setting.	The system should remove the last painting made by user from the picture.	The system removes the last painting made by user from the picture successfully.	Pass
4	Check the response when user click the erase button.	Click the erase button.	The system should remove all the paints on the picture.	The system removes all the paints on the picture successfully.	Pass
5	Check the response when user click the exit button.	Click the exit button on the top left corner of this page.	The system should navigate user to the Coloring Main page.	The system navigates user to the Coloring Main page successfully.	Pass
6	Check the response when user click the save button.	Click the save button on the top right corner of this page.	The system should save the picture into the user own device's image gallery and send a message "Image saved to gallery" to inform user.	The system saves the picture into the user own device's image gallery and send a message "Image saved to gallery" to user successfully.	Pass

6.1.20 Test Case for Drawing Page

No.	Test Case Description	Test Data	Expected Result	Actual Result	Pass/ Fail
1	Check the response when user click the color and draw on the picture.	Click to select the color and draw on the picture.	The system should let user to paint on the picture with the color selected.	The system allows user to paint on the picture with the color selected.	Pass
2	Check the response when user adjust the brush size and draw on the picture.	Adjust the brush size to the size the user wants and paint on the picture.	The system should show the color with the brush size user set.	The system shows the color with the brush size user set successfully.	Pass

3	Check the response when user click the undo button.	Click the undo button beside the brush size setting.	The system should remove the last drawing made by the user from the picture.	The system removes the last drawing made by the user from the picture successfully.	Pass
4	Check the response when user click the erase button.	Click the erase button.	The system should remove all the drawing on the picture.	The system removes all the drawing on the picture successfully.	Pass
5	Check the response when user click the exit button.	Click the exit button on the top left corner of this page.	The system should navigate user to the main page.	The system navigates user to the main page successfully.	Pass
6	Check the response when user click the save button.	Click the save button on the top right corner of this page.	The system should save the picture into the user own device's image gallery and send a message "Image saved to gallery" to inform user.	The system successfully save the picture into the user own device's image gallery and shows a toast message "Image saved to gallery".	Pass

6.1.21 Test Case for Setting Page

No.	Test Case Description	Test Data	Expected Result	Actual Result	Pass/Fail
1	Check the response when user click the "Progress Report" button.	Click the "Progress Report" button.	The system should navigate user to the Progress Report page.	The system navigates user to the Progress Report page successfully.	Pass
2	Check the response when user click the "Change Password" button.	Click the "Change Password" button.	The system should navigate user to the Change Password page.	The system navigates user to the Change Password page successfully.	Pass
3	Check the response when user click the "Chat Bot" button.	Click the "Chat Bot" button.	The system should navigate user to Chat Bot page.	The system navigates user to Chat Bot page successfully.	Pass

4	Check the response when user click the “Log Out” button.	Click the “Log Out” button.	The system should log out the user’s current account and bring user to the login page.	The system successfully log out the user from his or her current account and brings user back to the login page.	Pass
5	Check the response when user click the exit button.	Click the exit button.	The system should bring user back to the home page.	The system brings user back to the home page successfully.	Pass

6.1.22 Test Case for Progress Report Page

No.	Test Case Description	Test Data	Expected Result	Actual Result	Pass/Fail
1	Check the progress report shown when user click into this progress report page.	Enter this progress report page and observe the interface.	The system should display all the data relating to English subject Quiz in Easy mode on the screen by default.	The system displays all the data relating to English subject Quiz in Easy mode on the screen by default.	Pass
2	Check the graph shows the score data with a line.	Observe the graph matched with the score data above the graph.	The system should show the graph for the subject and difficulty mode set.	The system shows the graph for the subject and difficulty mode set.	Pass
3	Check the list of the subject work when user click on it to do selection.	Click the subject button and choose the subject they want to search.	The system should show the list of the subject: “English” and “Math”.	The system shows the list of the subject: “English” and “Math”.	Pass
4	Check the list of the difficulty mode for the subject selected work when user click on it.	Click the difficulty mode button to choose the mode they want to search the score data.	The system should show the list of the difficulty mode for the subject selected above. English: Easy, Medium, Hard	The system shows the list of the difficulty mode for the subject selected above. English: Easy, Medium, Hard	Pass

			Math: Addition, Subtraction	Math: Addition, Subtraction	
5	Check the response when user click on the search button.	Click the search button after choosing the subject and difficulty mode.	The system should show the score data with the date and time. It also includes the graph located below the score data.	The system successfully shows the score data with the date and time. It also includes the graph located below the score data.	Pass
6	Check the response when user click the exit button.	Click the exit button.	The system should navigate user to the setting page.	The system navigate user to the setting page successfully.	Pass

6.1.23 Test Case for Change Password Page

No.	Test Case Description	Test Data	Expected Result	Actual Result	Pass/Fail
1	Check the response when user enter both "New password" text field and "Confirm password" text field, then click "Done" button.	Enter the new password in both "New password" text field and "Confirm password" text field, then click "Done" button.	The system should show "Password changed successfully" and the new password should be updated into the Firebase.	The system shows "Password changed successfully" and the new password updated into the Firebase.	Pass
2	Check the response when user enter different password in the "New password" text field and "Confirm password" text field, then click "Done" button.	Enter different password in the "New password" text field and "Confirm password" text field, then click "Done" button.	The system should show the message "Passwords do not match"	The system shows the message "Passwords do not match" to user.	Pass
3	Check the changes of New Password text field when user click the visible button.	Click the visibility button inside the "New password" text view.	The system should change the password text field into visible/hidden.	The system changes the password text field into visible/hidden.	Pass

4	Check the changes of Confirm password text field when user click the visibility button.	Click the visibility button inside the “Confirm password” text view.	The system should change the password text field into visible/hidden.	The system successfully change the password text field into visible/hidden.	Pass
5	Check the response when user click the exit button.	Click the exit button in the top left corner of the page.	The system should navigate user to the setting page.	The system successfully navigate user to the setting page.	Pass
6	Check the response when user does not enter anything in the “New password” text field and “Confirm password” text field.	Leave the text fields empty.	The system should show the message “Please enter a new password” to user.	The system shows the message “Please enter a new password” to user successfully.	Pass

6.1.24 Test Case for Chatbot Page

No.	Test Case Description	Test Data	Expected Result	Actual Result	Pass/Fail
1	Check the response when user enter the word in the text field and click the send button.	Enter the word in the text field and click the send button.	The system should respond the user with the image of the word input by user.	The system responds the user with the image of the word input by user successfully.	Pass
2	Check the response when the image is not found.	Enter the word that is not able to be found in the database in the text field and click the send button.	The system should respond the message “Image not found for x”. (x is the word user entered)	The system responds the message “Image not found for x”. (x is the word user entered)	Pass
3	Check the response when user click the exit button.	Click the exit button on the top left corner of this chatbot page.	The system should bring user back to the setting page.	The system brings user back to the setting page successfully.	Pass

6.2 Testing Setup and Result

This application undergoes user evaluation after the alpha testing. Beta testing is conducted to collect the user feedback. It involved a group of selected external target user to test the application. Ten target users who are between 3 to 6 years old are invited to test this application and google form is created. Google form is more efficient to collect the feedback from them by specifying some specific questions. This survey form consists of 15 questions.

Q1) Kindly specify the age of the user
(10 条回复)

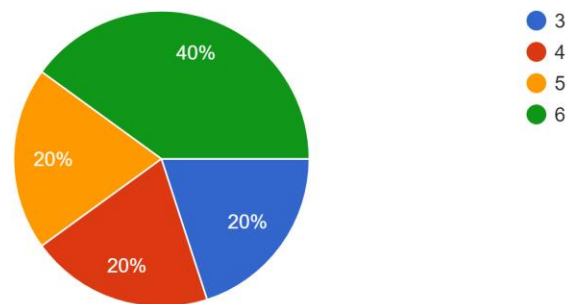


Figure 6.2.1 Survey result of Question 1

Question 1 is to analyze the age of the user. Based on the result in Figure 6.2.1, most of the users are 6 years old because the percentage of 6 years old is 40%. Then, other users are between 3 to 5 years old.

Q2) Is the sound played when clicking the buttons in the lessons and quiz sections (including English Easy & Hard modes) satisfactory?

(10 条回复)

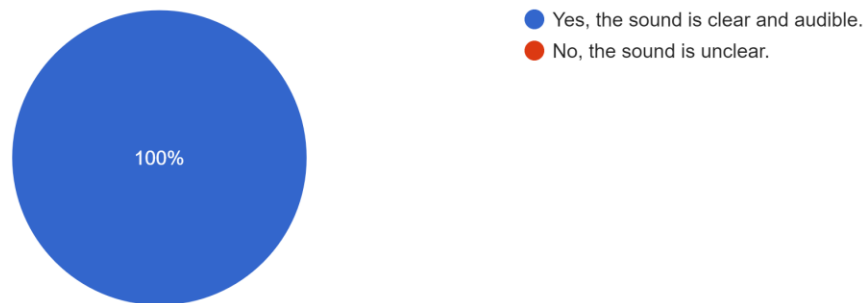


Figure 6.2.2 Survey result of Question 2

Question 2 is to ensure the sound functions are working and users can hear the sound clearly. These sound functions are included in English lessons and quiz (Easy and Hard modes). This question also helps the developer to identify the error in the sound buttons. According to the result shown in Figure 6.2.2, all responders are not facing any issues regarding the sound functions. All users are mentioned that the sound is clear and audible.

Q3) In coloring and drawing part, do you think the color options are sufficient?

(10 条回复)

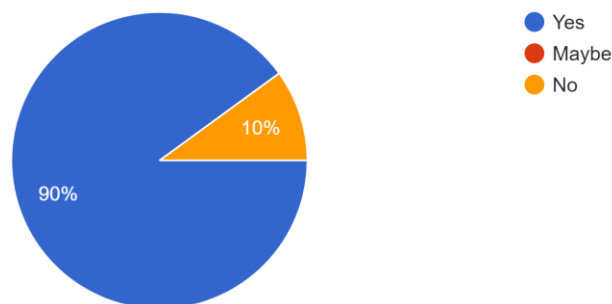


Figure 6.2.3 Survey result of Question 3

Question 3 is to analyze whether the color options included in the coloring and drawing part are sufficient. Currently, there are 12 colors available in these two parts (Coloring and Drawing). According to the result in Figure 6.2.3, 90% of the users think that the color options

are sufficient and there are only 10% of users think that there should be more color options included in coloring and drawing parts.

Q4) In coloring and drawing part, can you successfully save the picture into your own device's image gallery?
(10 条回复)

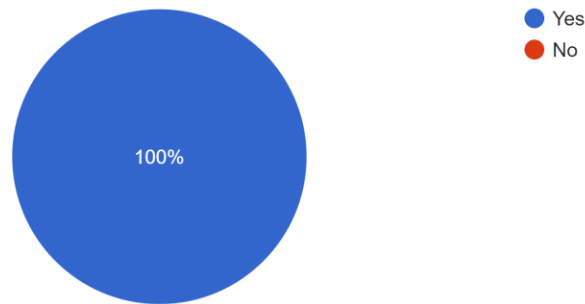


Figure 6.2.4 Survey result of Question 4

Question 4 is to ensure the save button is functioning and user can successfully save the picture into their device's image gallery. According to the result in Figure 6.2.4, all users respond that they can save their picture into their image gallery successfully. Therefore, there is no error in saving the pictures and the button is working.

Q5) In Quiz part, are those questions generated successfully?
(10 条回复)

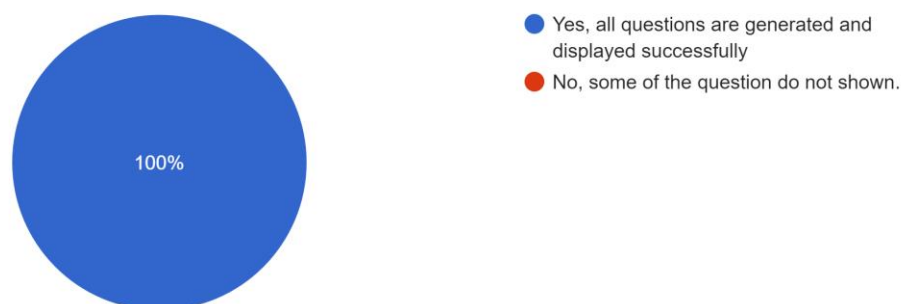


Figure 6.2.5 Survey result of Question 5

Question 5 is to ensure that the quizzes are generated the question for user. All users mentioned that all questions are generated and displayed to them successfully. Thus, it means that there is no error in this function.

Q6) In Math Quiz part, did you find the difficulty level of the questions appropriate?
(10 条回复)

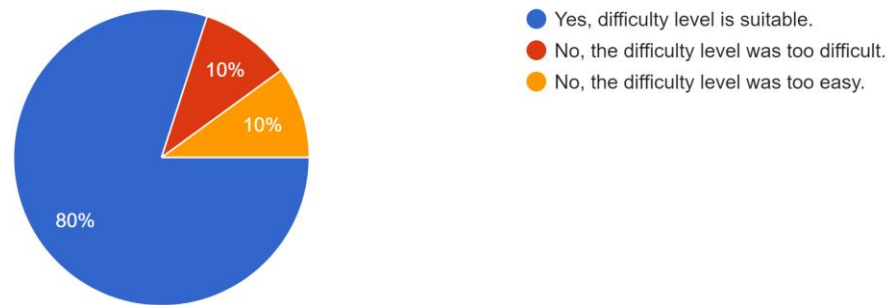


Figure 6.2.6 Survey result of Question 6

Question 6 is to analyze the perception of users regarding the difficulty level of the questions are appropriate. According to the result in Figure 6.2.6, 80% of the respondents mentioned that the difficulty level is suitable for the kids. 10% of the respondents think that the difficulty level was too difficult and another 10% of respondents think that the difficulty level was too easy for kids.

Q7) Do you think five questions are sufficient for each quiz?
(10 条回复)

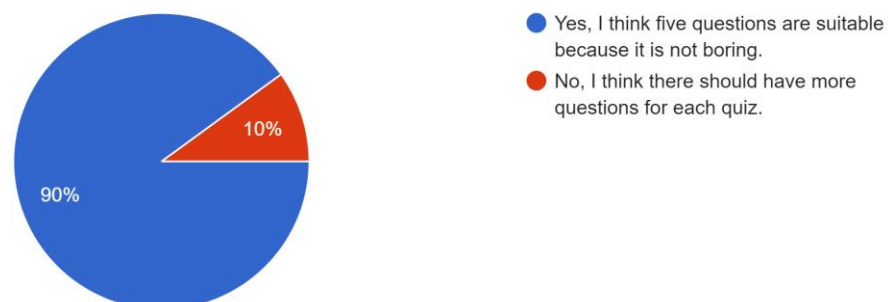


Figure 6.2.7 Survey result of Question 7

Question 7 is to analyze the perception of users on the number of questions are sufficient for each quiz. There are five questions for each quiz in all the modes of English and Math. According to the result in Figure 6.2.7, 90% of the users think that five questions are suitable because the user will not feel boring when answering the quiz. There is only 10% of users think that there should increase the number of questions for each quiz. Since this is a quick test for users, so five questions will be more suitable for them.

Q8) Do you think the time is enough for answering each question?

(10 条回复)

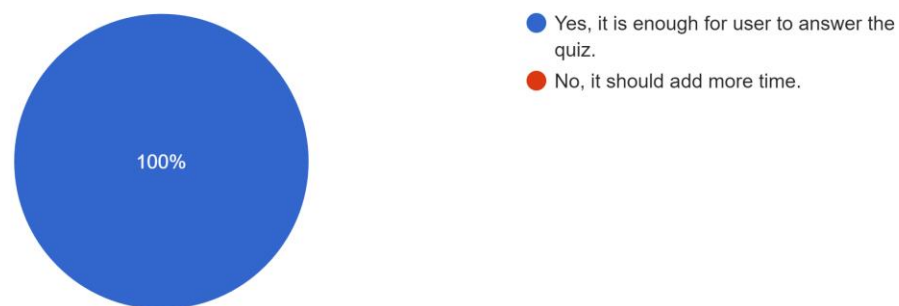


Figure 6.2.8 Survey result of Question 8

Question 8 is to collect the perception of users regarding the time set is enough for answering each question. There is different time set in different difficulty mode in English and Math quiz. For example, the addition and subtraction modes in Math quiz have 30 seconds to answer each question. For English quiz, there are 30 seconds per question in Easy mode, 40 seconds per question in Medium mode, and 45 seconds per question in Hard mode. According to the result in Figure 6.2.8, all respondents think that the time is enough for the quiz.

Q9) Is the progress report functions well and shows all the score data for the subject and difficulty mode selected?

(10 条回复)

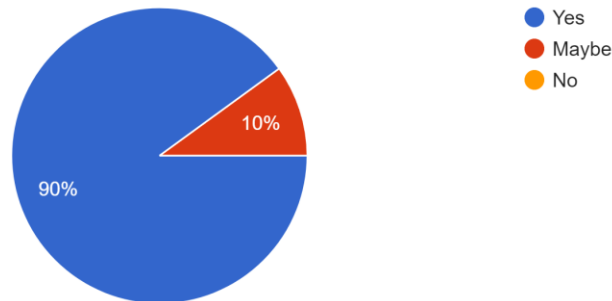


Figure 6.2.9 Survey result of Question 9

Question 9 is to ensure the progress report is working and it can show the score data with the graph to user. User can select the subject with the quiz mode to search the score data. According to the result in Figure 6.2.9, 90% of respondents mentioned that the progress report is working. Only 10% of respondents choose the “maybe” options.

Q10) Please rate the usefulness of the data presented in the progress report for tracking your performance.

(10 条回复)

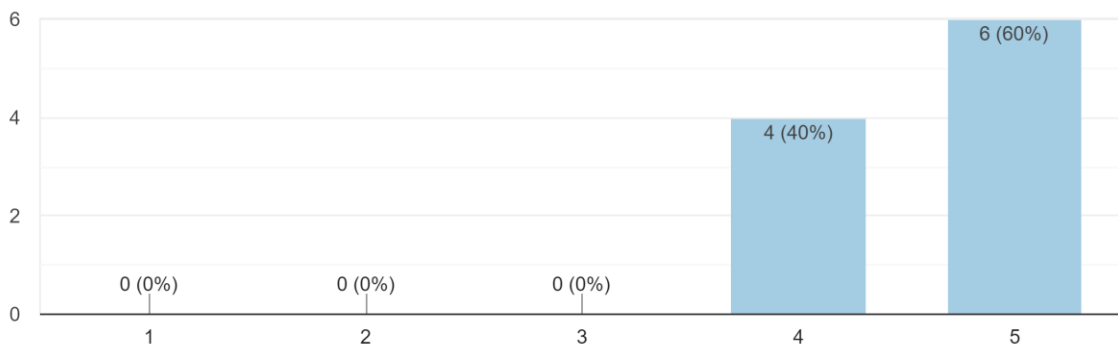


Figure 6.2.10 Survey result of Question 10

Question 10 is to let users to rate the usefulness of the data presented in the progress report. Progress rate can help kids or their parents to track their performance on the quiz. The choices

available are from 1 (Not useful at all) to 5 (Very useful). According to the result in Figure 6.2.10, 60% of respondents voted the rating of 5 (Very useful). There are 40% of respondents voted the rating of 4 (Useful). In conclusion, most of the users think that this progress report function is useful for tracking the performance.

Q11) Any issues for the chatbot function?
(10 条回复)

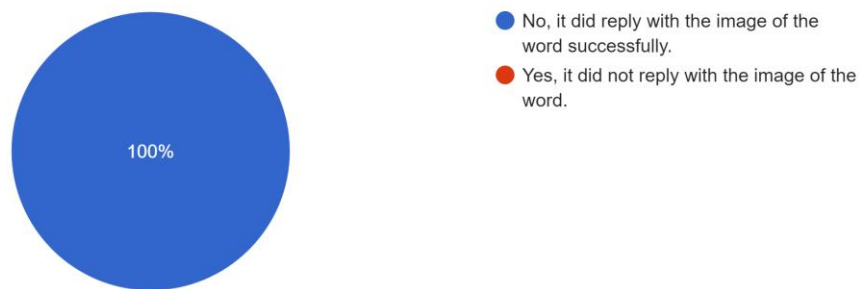


Figure 6.2.11 Survey result of Question 11

Question 11 is to identify the error and issue in the chatbot function. User can input the word which is available in the lessons part to the chatbot, then the system will reply with the image of the word to user. According to the result in Figure 6.2.11, there is no users faced issues in this chatbot function.

Q12) How would you rate the usefulness of this chatbot function
(10 条回复)

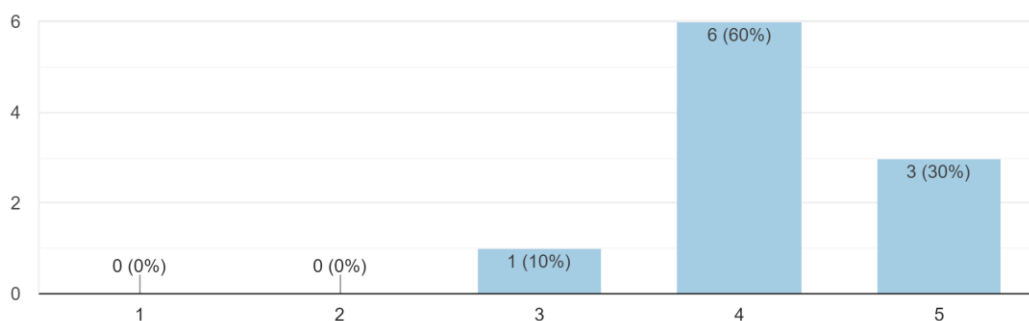


Figure 6.2.12 Survey result of Question 12

Question 12 is to collect the voting of users regarding the usefulness of this chatbot function. This question provide the selection from 1(very poor) to 5(very good). According to the result in Figure 6.2.12, 30% of users voted 5(very good), 60% of user voted 4(good) and only 10% of users voted 3(moderate). Most of them think that the chatbot function is useful for users to do revision.

Q13) How satisfy are you while using this application.

(10 条回复)

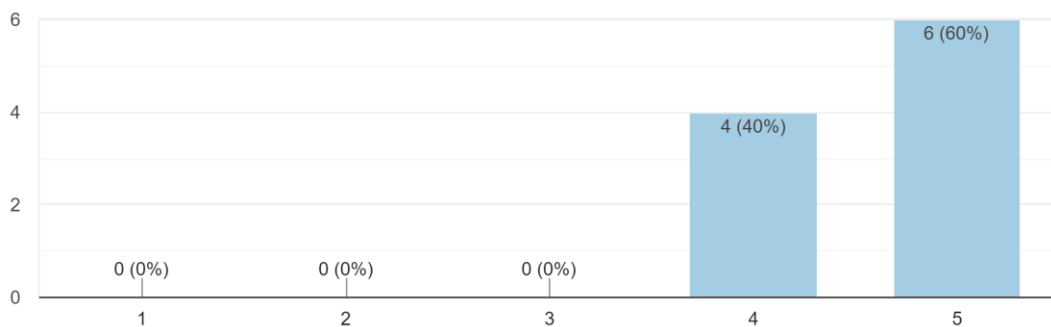


Figure 6.2.13 Survey result of Question 13

Question 13 is to collect the satisfaction level of users while using this application. The question include selection from 1(Very dissatisfied) to 5(Very satisfied). Based on the result in Figure 6.2.13, 60% of the respondents voted 5(Very satisfied) and there are 40% of respondents voted 4(Satisfied). In conclusion, all respondents are satisfied while using this mobile application.

Q14) Did you encounter any technical issues or bugs while using the application?

(10 条回复)

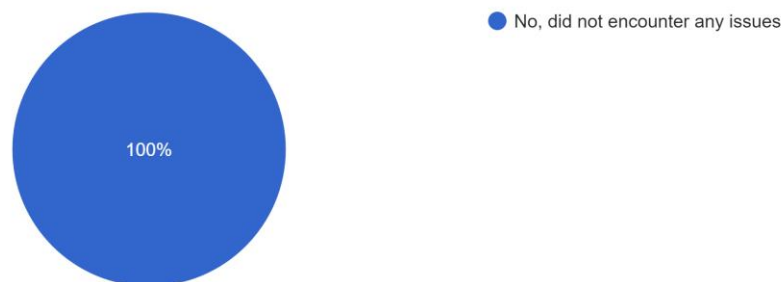


Figure 6.2.14 Survey result of Question 14

Question 14 is to identify the error or issue faced by users in this application. According to the result in Figure 6.2.14, all respondents said they did not encounter any issues or bugs in this application.

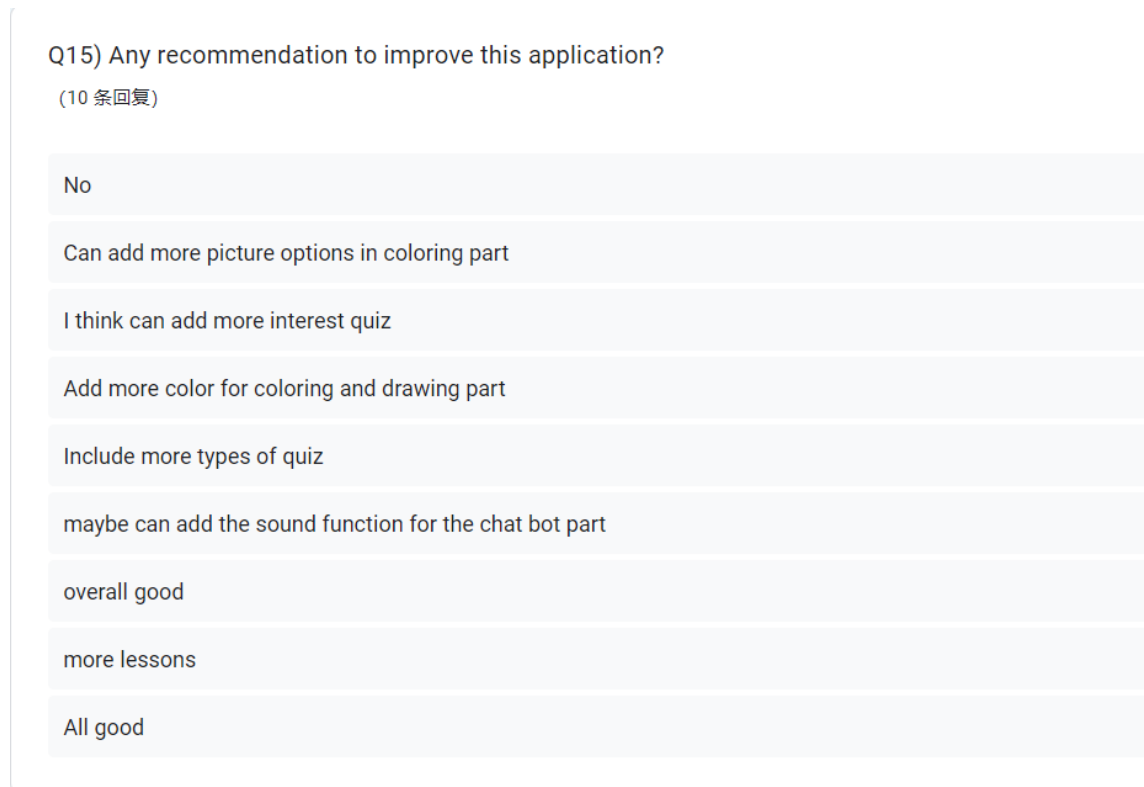


Figure 6.2.15 Survey result of Question 15

Question 15 is to collect the recommendations from users to do the future improvement. According to the result in Figure 6.2.15, two respondents suggested the developer to include more types of quiz and more interest quiz. There is a recommendation suggests developer to add more color for the coloring and drawing part. There is a respondent suggested to include more picture options in the coloring part for user to choose. Besides, there is also a suggestion about adding more lessons in this application.

6.3 Project Challenges

In developing this application, one of the challenges is creating the audio file for the sound of alphabets, words, and number. Because most of the websites are not free to download these audio files. However, there is also some websites that provides limited time for user to download the audio files. There is a large amount of audio files needed in this application. So,

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Faculty of Information and Communication Technology (Kampar Campus), UTAR

with this limited quantity problem, few alphabets and words must be generated together. After generating these audio file, the audio editor app is used to separate each of these alphabets and words to a separate file with name. Therefore, this process may take longer time because these files need to be edited manually.

6.4 Objective Evaluation

Objectives	Result	Remark
To help children to learn in a more flexible way	User can choose the subjects they want to learn based on their own pace. User can choose to do the quiz to test their understanding at any time and without any limitation. So, this application allows user to learn in a more flexible way.	Achieved
To increase the interactivity level in learning	This application includes a lot of interactivity in learning. User can click the word or alphabet to get the sound to learn more effectively. It also includes the quiz in which user can click to choose the answer and the question to play the sound. This app also includes the coloring and drawing function to entertain user.	Achieved
Develop a progress report for the parents to know the learning progress of their children	This application includes the progress report that recorded all the scores of the quiz. There is also a graph function that can show the scores in a line. They can see their quiz performance overtime clearly. They can choose the subject and the difficulty mode to view the scores data.	Achieved

6.5 Concluding Remark

In this chapter 6, it focuses on testing and evaluating this mobile application. This chapter includes the alpha testing and beta testing. Alpha testing is conducted before inviting the external user to evaluate the application. It is done by developer to check the error and ensure the application meet the requirements set. Beta testing is conducted by inviting a group of external users to do testing. Google form is created to collect the evaluation result. After collecting the result, then this result is analyzed by the developer. It also can help developer to identify the issues and obtain the idea in enhancing this application. Furthermore, three objectives of this project are fulfilled.

Chapter 7

Conclusion and Recommendation

7.1 Conclusion

In conclusion, this project is to develop a kids educational and entertainment mobile application for kids who are under the age range 3-6 years old to learn effectively. In research, there are three problem statements which are lack of flexibility and lack of interactivity in traditional education, and lack of progress report. Therefore, the purpose of creating this mobile application is to solve these problem statements. There are three main objectives of creating this mobile application which are to help children to learn in a more flexible way, to increase the interactivity level in learning, and to develop a progress report for the parents to know the learning progress of their children. In this FYP2, the application is developed successfully, and these three objectives are fulfilled. This application includes two main subjects which are English and Math, it also includes coloring and drawing modules as entertainment functions for user. Besides, it includes the progress report function to help user to view their performance in quiz. After developing this application, testing and evaluation are implemented by developer and external user. The detailed testing is conducted by developer through alpha testing. Then, user evaluation is conducted through beta testing. Developer invites a group of external users to test the application and fill up the google form. This user evaluation can help developer to identify the error and ensure this application meets the requirements of user.

7.2 Recommendation

In the current stage, this application focuses on English and Math subject, coloring, and drawing. The recommendation for improving this application is to include more lessons, such as Science. This is because broader range of lessons can increase the usefulness of this application. Then, user can obtain more knowledge from this application. Besides, based on the recommendation given by the external user via the user evaluation, the coloring part should add more picture options for user to choose. Furthermore, some external users suggest adding the sound function into the chat bot module. In future, this sound function can be included when the picture sent to user as a response. More picture options can increase the attractiveness of the application. In addition, future improvement also can include the 3D functions in this application. This is because technology is more advanced nowadays, therefore this function can apply this latest technology to enhance the quality of the application. For example, the 3D model of the shape with the interactive function in which user can interact with the model. It

can increase the attractiveness of this application and kids can learn more effectively. Moreover, this application can also include different types of quiz for English and Math subjects. For example, the quiz can include more interactive activities such as fill in the blank exercise for English Quiz. As a result, these future improvement in the application can enrich the learning experience of users.

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APPENDIXES

Appendix A

Q1) Kindly specify the age of the user *

3

4

5

6

Q2) Is the sound played when clicking the buttons in the lessons and quiz sections (including English Easy & Hard modes) satisfactory? *

Yes, the sound is clear and audible.

No, the sound is unclear.

Q3) In coloring and drawing part, do you think the color options are sufficient? *

Yes

Maybe

No

Q4) In coloring and drawing part, can you successfully save the picture into your own device's image gallery? *

Yes

No

Q5) In Quiz part, are those questions generated successfully? *

- Yes, all questions are generated and displayed successfully
- No, some of the question do not shown.

Q6) In Math Quiz part, did you find the difficulty level of the questions appropriate? *

- Yes, difficulty level is suitable.
- No, the difficulty level was too difficult.
- No, the difficulty level was too easy.

Q7) Do you think five questions are sufficient for each quiz? *

- Yes, I think five questions are suitable because it is not boring.
- No, I think there should have more questions for each quiz.

Q8) Do you think the time is enough for answering each question? *

* If no, please recommend the time and the quiz mode in the last "other" part field.

- Yes, it is enough for user to answer the quiz.
- No, it should add more time.

Q9) Is the progress report functions well and shows all the score data for the subject and difficulty mode selected? *

- Yes
- Maybe
- No

Q10) Please rate the usefulness of the data presented in the progress report for tracking your performance. *

	1	2	3	4	5	
Not useful at all	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very useful

Q11) Any issues for the chatbot function? *

- No, it did reply with the image of the word successfully.
- Yes, it did not reply with the image of the word.

Q12) How would you rate the usefulness of this chatbot function? *

	1	2	3	4	5	
Very poor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very good

Q13) How satisfy are you while using this application. *

	1	2	3	4	5	
Very dissatisfied	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very satisfied

Q14) Did you encounter any technical issues or bugs while using the application? *
* If yes, please specify in "other" field.

- No, did not encounter any issues
- 其他: _____

Q15) Any recommendation to improve this application? *

您的回答

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: Y3S3	Study week no.: 2
Student Name & ID: Foong Ling Yee 20ACB01838	
Supervisor: Dr Sayed Ahmad Zikri Bin Sayed Aluwee	
Project Title: Kids educational and entertainment mobile application	

1. WORK DONE

[Please write the details of the work done in the last fortnight.]

I have done reviewing and refining the FYP1 report. Besides, I have done modifying the code of login page. I have done modifying the activity diagrams, block diagram and flow charts. Because I would like to add some extra function into this application, such as add different difficulties for the quiz mode.

2. WORK TO BE DONE

I will create the interface and write the function of quiz for both English and Math.

3. PROBLEMS ENCOUNTERED

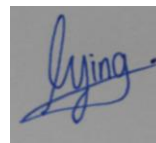
None.

4. SELF EVALUATION OF THE PROGRESS

The different difficulty modes of the quiz are designed well and suitable for kids.

Sayed

Supervisor's signature



Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: Y3S3	Study week no.: 4
Student Name & ID: Foong Ling Yee 20ACB01838	
Supervisor: Dr Sayed Ahmad Zikri Bin Sayed Aluwee	
Project Title: Kids educational and entertainment mobile application	

1. WORK DONE

[Please write the details of the work done in the last fortnight.]

I have done creating the quiz for English and Math subjects. For English quiz, I have created three different difficulty modes which are 'Easy', 'Medium', and 'Hard'. For Math quiz, I have created two modes which are 'Addition' and 'Subtraction'. Each mode consists of different testing method and have set the suitable time for answering each question.

2. WORK TO BE DONE

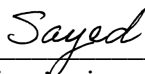
I will create the setting function interface and the function inside the setting page.

3. PROBLEMS ENCOUNTERED

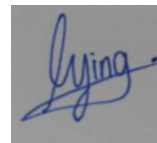
None.

4. SELF EVALUATION OF THE PROGRESS

The coding part for quizzes are working as I expected.



Supervisor's signature



Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: Y3S3	Study week no.: 6
Student Name & ID: Foong Ling Yee 20ACB01838	
Supervisor: Dr Sayed Ahmad Zikri Bin Sayed Aluwee	
Project Title: Kids educational and entertainment mobile application	

1. WORK DONE

[Please write the details of the work done in the last fortnight.]

I have done creating the interface of setting page. I also created the change password function, and the password can successfully be updated into the Firebase. Then, I also fix some error encountered in the quiz part. I have created the score page for the quiz and the score can successfully save into the Firebase real time database.

2. WORK TO BE DONE

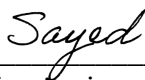
I will create the function inside the setting page.

3. PROBLEMS ENCOUNTERED

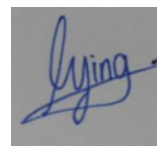
None.

4. SELF EVALUATION OF THE PROGRESS

I should spend more time for this project.



Supervisor's signature



Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: Y3S3	Study week no.: 8
Student Name & ID: Foong Ling Yee 20ACB01838	
Supervisor: Dr Sayed Ahmad Zikri Bin Sayed Aluwee	
Project Title: Kids educational and entertainment mobile application	

1. WORK DONE

[Please write the details of the work done in the last fortnight.]

I have done creating the progress report and the scores data are successfully retrieve from the Firebase and show to user. I also created the graph function inside this progress report part. The system can show all the scores of the subject and mode selected in the graph with line. I have created the chatbot function and logout function.

2. WORK TO BE DONE

Improve the UI of the application and finalize the system. Start to test the application.

3. PROBLEMS ENCOUNTERED

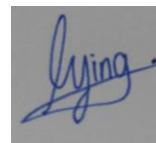
The graph cannot show all the date and time of the scores because it does not have enough space and it will cause user hard to understand.

4. SELF EVALUATION OF THE PROGRESS

All functions created are same with the design.

Sayed

Supervisor's signature



Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: Y3S3	Study week no.: 10
Student Name & ID: Foong Ling Yee 20ACB01838	
Supervisor: Dr Sayed Ahmad Zikri Bin Sayed Aluwee	
Project Title: Kids educational and entertainment mobile application	

1. WORK DONE

[Please write the details of the work done in the last fortnight.]

I have done the alpha testing and beta testing. Besides, I also created a google form for user evaluation part. I have included all the test case inside the report and do analysis for all the test case. All the test cases are working as expected.

2. WORK TO BE DONE

I will collect all the result of the survey form and do analysis.

3. PROBLEMS ENCOUNTERED

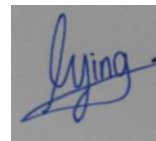
None.

4. SELF EVALUATION OF THE PROGRESS

All the parts are tested and the result are documented clearly in the report.

Sayed

Supervisor's signature



Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: Y3S3	Study week no.: 12
Student Name & ID: Foong Ling Yee 20ACB01838	
Supervisor: Dr Sayed Ahmad Zikri Bin Sayed Aluwee	
Project Title: Kids educational and entertainment mobile application	

1. WORK DONE

[Please write the details of the work done in the last fortnight.]

I have collected the survey result and do analysis. Then, I have finalized the report.

2. WORK TO BE DONE

Submit the FYP2.

3. PROBLEMS ENCOUNTERED

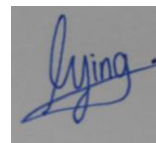
None.

4. SELF EVALUATION OF THE PROGRESS

All parts are completed well.

Sayed

Supervisor's signature



Student's signature

POSTER

Kids Educational and Entertainment Mobile Application

Prepared by: Foong Ling Yee 20ACB01838

Introduction

With the help of technology, people can learn remotely at any time and any place by using the mobile application. Children can learn from the app to be well-prepared to study in school. It can enhance the academics of children because it not only involved words in teaching them, but it also involves multimedia elements such as pictures and sound. This app also can let children learn according to their own pace.

Problem statements

- Lack of flexibility while learning in traditional education mode
- Lack of interactivity while learning in traditional education mode
- Lack of progress report



Project objectives



To help children to learn in a more flexible way



To increase the interactivity level in learning



Develop a progress report for parents to know the learning progress of their children

Project scope

- Includes two subjects: English & Math
- Each subject has lessons and quizzes
- Interactive learning: Press and get sound
- Coloring and drawing function

Method

- Use Android Studio Java language
- Use Firebase database



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ID Number(s)	20ACB01838
Programme / Course	Bachelor of Information Systems (HONOURS) Business Information Systems
Title of Final Year Project	Kids educational and entertainment mobile application

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Number of individual sources listed of more than 3% similarity: <u> 0 </u>	
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Note Supervisor/Candidate(s) is/are required to provide softcopy of full set of the originality report to Faculty/Institute

Based on the above results, I hereby declare that I am satisfied with the originality of the Final Year Project Report submitted by my student(s) as named above.

Sayed Ahmad Zikri

Signature of Supervisor

Name: SAYED AHMAD ZIKRI BIN SAYED ALUWEE

Date: 19/4/2024

Signature of Co-Supervisor

Name: _____

Date: _____



UNIVERSITI TUNKU ABDUL RAHMAN

**FACULTY OF INFORMATION & COMMUNICATION TECHNOLOGY
(KAMPAR CAMPUS)**

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Supervisor Name	Dr Sayed Ahmad Zikri bin Sayed Aluwee

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