**Introduction**

For an app to be ready for the market, it must go through a design face before any coding happens. In assignment 3, we have gone through the process of gathering opinions from people. Using affinity sort and empathy map to map all the ideas we gathered from the public for further discussion. I also ideate seven different designs for the app.

I have many a prototype of the How to tell time application. I named the application “FunTime” For this essay, I will be providing an overview of the solution architecture and solution interface. I will also discuss the feature that I have added to the app and will describe each feature with the knowledge I learnt from MDD lectures.

**Solution architecture**

The **target market** is parents who have kids that are studying in grades 1-3 (This is when most students started learning about time). My program is mainly designed according to the South African Mathematics curriculum during the foundation phase (Gr 1 - 3). The reason why I want to target the parent is. I am assuming that most students from grades 1 to 3 do not have a phone, so they don’t have access to the play store, which is where the app will be, most parents have a phone and some parents do not want their children spending their time on games like Clash of Clans, but rather educational games like “FunTime”. So drawing the attention of the parents will make them want their children to play FunTime. So this will be good for the marketing of the game.

I want to make it an **android app**. People in rural areas are more likely going to own an android phone rather than the more expensive option like apple or PCs, therefore it is a better architecture for more people to use. The reason why I want it to be an app over the web is that poorer people may find the internet very expensive, the app should be able to run offline as there is no multiplayer mode in the app so that people do not need internet to play. For the **server**, the app should use the Google Games server, Play Games is a pre-existing server that many smartphones have. This server is used to store all the FunTime process that the user has saved. Play Games is cheaper to implement compared to a server made by the developers. A server is **not required** for the user to use the app since many older phones do not have Play Games, the server is only there to save the class progress of the student.

A screenshot of a video game

Description automatically generated with medium confidence A picture containing application

Description automatically generated A screenshot of a video game

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Figure 1: FunTime main screen Figure 2: FunTime Learn page Figure 3: FunTime Game page

A screenshot of a video game

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Figure 4: Boss fight Figure 5: Matching time Figure 6: Class

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Figure 7: Quiz Figure 8: Time reader Figure 9: Setting

Graphical user interface, application

Description automatically generated A picture containing text, electronics

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Figure 10: Boss fight Start Figure 11: Boss fight end

**Overall design and layout**

My app will consist of 3 navigation pages them being the **Main, Learn and Game** pages. The Main page will be the first page that you see when you open the app. This page is the page that allows the user to navigate to either Learn or Game page. Learn will contain the options that are for students to learn how to read the time. The game will contain an entertainment option that is useful for the user to learn.

There are many features in my program, the following features are the ones that I will talk about in the report. The theme is **bright and colourful**. This kind of theme is eye-catching and children like colourful stuff which can bring more joy when kids playing this game. In all the figures I have included a colourful background, and all the buttons are using bright colours. The **cartoon characters**are also suggested by many, children love cartoons and especially Disney characters. I have included Mickey Mouse characters because they are amongst the most popular ones. In all the figures, we can see that the buttons are cartoon characters with colourful captions. I assume this is more eye-catching for children as they love cartoons. Children love playing **games**, games are one of the popular entertainments amongst children. Bring games to education will allow children to be focused and entertained to learn about time than just classes and quiz where children can easily get bored. So I have shown what the Boss Fight game looks like in figure 4, the game is cartoonish, and it is making the children think about problems related to time.

The class, quiz and time reader are the option for the learning navigation page. Class is the page that teaches children how to read the time. The class is in video format with a summary of the video written as text, in the end, the quiz is similar to homework and time readers can be used for children to assist them with homework or they can use it to help them understand time. I won’t get into too many details with these pages because they are not part of the features, and I am going to explain

To prevent user errors, every navigation page will have a return button so that if the user decided that they want to leave or enter the wrong page. They can always return to their previous page. I also made the settings simple with only a few buttons. This is to make it simple to navigate and since it is an app for children to use. I did not add buttons such as notifications because it might be too complicated for children to understand.

The app should be able to run on all **android devices** that have more than 1GB of RAM and can run Android 6 or above, although the game can be designed to run android lower than 6, it would require more resources to design such an efficient game and the number of people using it will be very little. So it is impractical to go any. Most phones do meet this requirement and it should be enough to run the game smoothly without lag.

**Feature rationale and design**

**Feature 1: Bright, colourful**

Many primary schools around the country have the theme of bright colours. Like we can often see cute drawings on the walls of the primary school. This idea was also given by my primary school teacher, she taught me in grade 5 and I believe that her advice is very helpful. When I was in primary school, most toys I play are in bright colours. I believe that bright colour is more attractive to a children’s eye than to an adult’s eye. My primary school teacher’s interview can be found in my assignment 3, interviewee 7 and question 6. According to Sciencing1, children tend to find bright colours more appealing because their sense of colours is not fully developed yet. So with my theme being bright will be very helpful in making it more appealing to children.

In all the figures above, you can see the background of the app is a colourful theme. This I am sure that children will find it much more appealing compared to just looking at white background. The buttons are in bright colour and every button have a colour theme to it to add more colourfulness to the application. To trigger this, all the users have to do is just open the app. To make the game even interesting, the background will be a moving image the colours should move like water and every time you touch the background, it should respond with an animation of a water droplet. A swipe will be like us moving our hands across the flowing liquid. This certainly will add more fun to the game. This kind of animation will require some CPU power, so there will be a setting where the user can turn this feature off.

**Strive for consistency** is the key concept I used for this feature; this concept is aiming for different pages that should not vary too much in style.5 Too much difference can confuse and make users more vulnerable to making errors. I am using the same bright and colourful background for every page and the same font for every page except the button on the main page. The different background will likely make the user think he/she did something wrong or think it is a bug. Strive for consistency also mentions that reduce short-term memory load, most of the options I made in the game will not result in **short-term memory load** because there is nothing that other pages need for it to work. I deliberately time readers and quizzes because I do not want the student to refer to the time reader while doing their homework. It would be almost like cheating because they won’t use mathematical equations to solve problems rather, they would just refer to a tool to help them solve problems. This design is motivated by my primary school teacher because she is one of my favourite teacher and she gave me this idea.

**Feature 2: Cartoon characters:**

My interviewees 3, 5 and 6 all suggested that the cartoon characters should be included as they are help students becoming more entertained. Children love cartoons and Mickey Mouse is amongst the popular cartoons. So I used some Mickey Mouse characters which I assume will be more attractive to kids compare to other cartoon characters. When I was young, I loved Disney movies and cartoons, mickey mouse is one of my favourites. According to an article written by R Kaul2, children find cartoons much more interesting because they do not reflect the hardship in life. They create a world that children can relate to, the abilities/power that the cartoon characters have makes children see them as role models. The language that cartoons characters speak is often much easier for children to understand compared to shows that adults watch. So having cartoon characters will make children more interested and making study easier for them.

As you can see in Figures 1, 2, 3 and 5. There is all mickey mouse character in the figures. They will be moving and able to talk to users. The message box is the words that they say, and the mic represents that they are talking. The mic can also be press for the user to hear what the mickey mouse said. The moving mickey mouse can be waving hands when the user enters the game. This feature can also be turned off in the settings as not all phones are capable of handling character movements. The characters are normally located at the top or bottom. I want it to be at different locations randomly because it makes the app more interesting and brings changes to the application. It would be a bit boring if the characters are always the same and at the same location.

Offer **informative feedback** is the key concept I used for this feature, for every user action, there should be interface feedback.5 Every button in the app will navigate the user to a new page or perform some action. Every cartoon character in the app will be able to speak and guide the user in how to use the app. Children often have problems with navigating apps because they are much more illiterate when compared to adults. So cartoon characters can create interactions between user and application for the user to make a better decision. The feedbacks from the cartoon characters on the next page can greet and tell the user which page he is on and what is this page about. This is extremely helpful to prevent errors from happening when the user is using the application. This idea is motivated by my love for Disney movies, I love Disney movies, been to Disney World in both Shanghai and Orlando, their cartoon are very good and I enjoy them very much.

**Feature 3: Games**

My interviewees 2, 6 and 7 all suggested that this app should have game features. Making education like a game will be very good for children to enjoy studying while playing games. When I was young, I love computer games, and all my friends do. Today, I’m sure there are many children playing games on their or parents’ phones. Many parents don’t like their children to play games so if I can make a game that allows children to have fun and being able to study at the same time. I’m sure the parents will be happy for their children to play this game. According to an article written by Dr Randy Kulman3, games are fun and challenging to figure things out. Children are curious and they want to figure out a solution to the challenges. And the challenge in my game is to defeat the boss. So children will want to beat the boss in the game which makes it a great feature that can entertain and educate children.

To play a game, the user will have to press games on the main screen in figure 1, then there will be 2 games on the Game page. They are Boss fight and matching time shown by Figures 4 and 5 respectively. Games should be fun and interactive, that is why in Boss fight, we can see that the user will have to fight a boss. To beat the boss, the user must answer the question correctly. So having competitive elements in an educational game like this can make children have more fun and learn more. The matching time is a much calm game compared to Boss Fight. This is for kids that enjoy matching points in school. When I was in primary school, matching points are one of my favourite exercises and I’m sure children will also be entertained by this game. The reason why I want to make my games on a separate navigation page and not in main is that I do not want to mix the class and the games. Games should be on a separate page because it would be easier for children to find all the games they want to play on a page and not searching for it in the main page that will be mixed with classes, quizzes, and time reader. Which could make the app more complicated.`

**Design dialogue to yield closure** is the key concept I used for this feature. Sequences of actions should be organized into groups with a beginning, middle, and end. When the user starts the game, they will be brought to a new page shown in figure 10, this page is telling the user that he is about to enter the game.5 While the user is playing the game, every time the user gets an answer correct, the boss will be taking damage. To show that the boss is taking damage, his health will be decreasing, he will be yelling in pain and there will be sound effects of damage taken by the boss. When the user finishes, a page like the Figure 11 will be displayed. This page is telling the user that he has beaten the boss and give the user some stats of the game he plays with a cartoon character congratulating him. So every action in the game will have some response to tell the user that he is either right or wrong. This idea is motivated by my love for games, I love League of Legends and Genshin Impact, there are very well-designed games and I still enjoy them. I believe that children would enjoy games too

**Reference:**

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