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CSC2002S : Assignment 4 Mobile Design and Development 2 Design a prototype

Introduction

Computer Science students that are doing second year are given a task to develop a digital tool that will help young children to learn how to read time, as part of the Mobile Development and Design module. The problem being raised is aligned to making children who are doing Grade 1 to 3 understand the curriculum and engage with it while having fun. The task is broken into two parts mainly, conducting interviews so, as to gain empathy from the users and designing a prototype for the tool.

This document focuses on the part of designing the prototype based on the findings from the potential users of the tool. The requirements of the digital tool were found by engaging with people that have experience in reading books for children or has some experience in assisting children with their schoolwork. Children are also ideal interviewees for this task as they will be the direct users of the tool. The tool will help them in telling 12-hour time in hours, half hours and quarter hours. They will also gain experience in using clocks to calculate elapsed time in hours, and half hours on analogue and digital clocks.

Overall Architecture

Upon the completion of the interviews. Children need a way to learn how to read time that will not bore them, meaning that they should have fun in the process. I came to the decision that a mobile application can be the best solution to the problem. The mobile application will be in a multiform that will teach children the components of the clock and allow them to play games so, as to embed the information in their memory. The application meets the users' requirements because the children will have fun while learning the concept and it has cartoons to increase their interest in the mobile application. The mobile application will be a cross platform application, so that everybody that has a mobile device can be able to install the application. Making the application native to only one operating system will cause other potential users to be left out. The application will not require any server because it will not require mobile data or any internet connection for running the application, but little data connection will be required for downloading the application from the distributor such as Play store for Android users and App store for Apple users. The application will not require any internet connection after being installed to cater for the population of the potential users that live in areas with low bandwidth.

Solution interface overview: The overview of the solution that I came up with is as follows

Figure 1: Language option triggered

Figure 2: Done button clicked

Figure 3: Name input field clicked

Figure 4: Return button clicked

Figure 5: Start button clicked

Figure 6: Welcome page and username.

Figure 7: Play Games button clicked

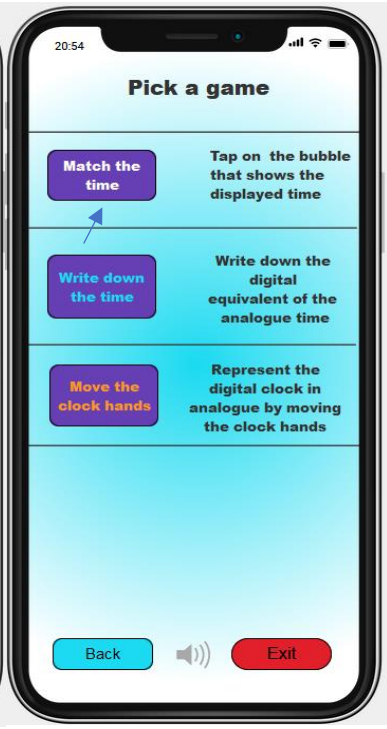

Figure 8: Games menu

Figure 9: Match the time game

Figure 10: Sound button clicked

Figure 11: Back button clicked

Figure 12: Back to the game menu

Figure 13: Digital equivalent game *Figure 14: Time input clicked* *Figure 15: Time selection options*

Figure 16: Move clock hands game *Figure 17: Study option selected* *Figure 18: Study main menu*

Figure 19: Digital clock components

Figure 20: Learning menu

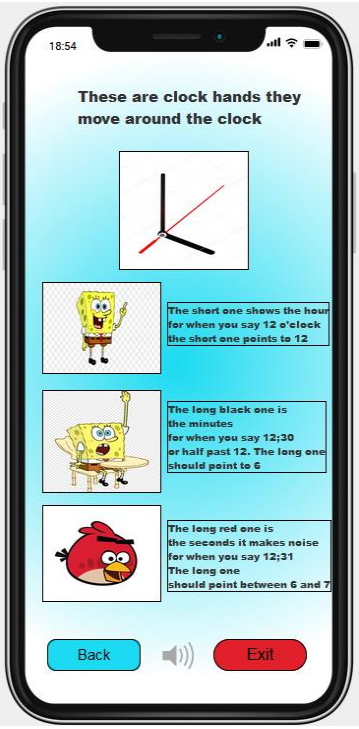

Figure 21: Analogue clock components

Figure 22: Analogue and digital clock

Figure 23: Exit button clicked

Target users of the application are children and parents. The parents will be facilitating the security of the application, since through the interviews they stated that the application should be secured. Children who are in grade 1-3 will be the primary users of the application. The children will use the application to learn about time through engaging with the application. Whenever the exit button is clicked the password interface pop up, since the parents indicated that the application should be secured to prevent the child from exiting the app. The password will be based on the parent's device password.

The application is easy to use, fields that require user input such as in *Figure 15* have prepopulated entries that the user can choose from to avoid the user entering string characters or special characters in the time field. This is how the errors are prevented in the application, as the target users are children who are bound to press anything in the text field for the sake of writing. The application can run in iOS devices and android devices. The layout of the application will be consistent across all mobile devices. The application will fit automatically for wide screen devices such as tablets or iPads.

Feature Rationale and Design

1. Cartoons and Bright colours

The mobile application has a variety of cartoon characters such as Mickey Mouse and SpongeBob square pants. The cartoons are used as a feature of attracting the user's attention. The research done which was interviewing parents and teachers of young children stated that children pay attention when they see their famous characters no matter what they were doing. The parents stated that immediately when a cartoon character pops up in the television, children tend to stop what they were doing and start listening to the cartoon. Based on the information provided by the parents I went further and conducted research around the interest of children in cartoons. I found an article called Cartoons Aren't Just Bright Colors — There's A Lot Of Connection There For Kids. The article states that, "So, while all the bright colors and happy toon critters can keep your child glued to the TV, Mann says their connection to the characters is what will keep them coming back for the next episode. And they don't have to be singing mice or talking trains for that to happen." [1].

After the research the cartoon feature with bright colours was implemented so that children can take the mobile application serious and gain interest in learning about time. Furthermore, as seen in *Figure 17* above, the cartoon greets the child with their name because children who are in grade 1-3 tend to get excited when they see their name. Greeting them with their name will also attract their attention. The feature states design principle [2] which is number 3, which is about offering informative feedback to the user. This shows the user that they did not enter their name for fun but rather used to address them, as seen in *Figure 10* and *Figure 13* the name of the user is used.

2. Games

The feature is implemented for making sure that the users grasp the concept of time by applying the knowledge through interactive games. Most children grasp concepts through visualization and interaction. The feature is implemented by introducing a main menu for all the games that are available along with their descriptions.

The popping bubbles game shown in *Figure 9* requires the user to match the time shown in the analogue face by popping the bubble that corresponds with the time. A score display is available for the user to be able to track how well they know the concept being tested. This feature implements offer informative feedback and prevent errors principles from [2]. The errors are prevented by displaying bubbles with the time to avoid getting text input from the user and children enjoy popping bubbles. This will make them enjoy the game while learning.

The digital equivalent game shown in *Figure 13* requires the user to represent the analogue time in digital form through a text box. The text box does not require the user to type using the keypad of the mobile phone but rather scroll through the prepopulated entries. This feature follows the prevent errors principle from [2] which is number 5 in the principles list. An error that would have occurred would be the user typing a word instead of numeric digits.

The move clock hands game shown in *Figure 16* is implemented for allowing the user to play with the clock hands to try to represent the digital clock displayed. This feature implements the keep users in control principle in [2]. The reason for stating that the feature keeps the user in control is that the user will have power of moving the clock hands of which the user in the previous games had no power of moving the clock hands.

3. Study

Feature study is introduced in *Figure 17* which models feature 1 discussed above. The feature is implemented for teaching the user clock components, to understand the terminology used in the games that they are going to play. The feature is implemented in *Figure 19*, *Figure 21*, and *Figure 22*. The feature follows the principle permit easy reversal of actions, reduce short-term memory load as the app is designed for young children who are not capable of memorizing large chunks of information all at once. The principles are stated in [2], they number 6 and 8.

The need for the study feature is to make sure that the users can identify the correlation between the analogue clock and digital clock because most children tend to separate the two and think that they are not referring to the same thing. As seen in *Figure 22* a diagrammatical combination of the analogue clock and digital clock which are accompanied by a text from a cartoon to make sure that the user can read the text.

4. Sound

The sound feature is implemented for allowing the user to turn on the sounds while interacting with the application. The sound icon initially appears as being greyed out, but immediately when the user clicks it, the icon becomes yellow, as shown in *Figure 9 and 10*. This feature implements the offer informative feedback principle in [2]. The sound effect is

used differently in the user interface. For example, when the user is interacting with the interface without engaging in any activity such as playing games, a normal sound such as Mickey Mouse clubhouse theme song. When the user is engaged in the study activity sound of the clock ticking will be used. The sounds when the clock is in the past region, as in 10 minutes past region, the clock will have sound effects that will be distinct to when the clock is in the to region. This feature will allow the user to use the hearing sense when they are analysing an analogue clock, since some children remember concepts better through sounds.

5. Password protection

The application is password protected as per the parents and teachers request. The password feature is only invoked when the exit button is clicked, so as to stop the child from leaving the application and also block any notifications th

References

[1] Katie McPherson April 29, 2020 Cartoons Aren't Just Bright Colors — There's A Lot Of Connection There For Kids
[2] Shneiderman, B., Plaisant, C., Cohen, M., Jacobs, S., and Elmqvist, N., Designing the User Interface: Strategies for Effective Human-Computer Interaction: Sixth Edition, Pearson (May 2016) http://www.cs.umd.edu/hcil/DTUI6