Developing a multiplayer game-based language learning application

Erica Honadel
Mentored by James Schoening and Casey Rock

Introduction

English literacy is an important skill for individuals living in today's interconnected world, as it is one of the primary languages used throughout the world. Unfortunately, many children throughout the developing world do not have access to education, and as a result, never have the opportunity to learn English. Educational mobile software has shown promise as a potential solution, particularly as smartphone usage has increased exponentially in developing countries.

Game-based learning is a method of active learning used to supplement traditional teaching methods. There have been many studies investigating the effectiveness of using computer or mobile game-based educational software. In a study done by Partovi & Razavi (2019), there was a significant increase in the educational achievement levels within the group of elementary school students who used the educational software.

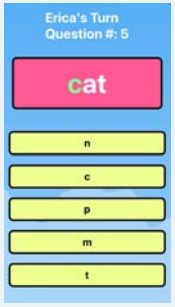
However, a common issue associated with educational software is that the users tended to lose interest after a short period of time. Researchers found that children spent less time on each session over time and neither the implementation of a rewards system nor more challenging content had a statistically significant effect on the time spent on the app (Ronimus et al., 2013).

The purpose of this project was to improve a game-based language learning software by making changes to the aesthetics and adding a team mode. The functionality of these improvements would then be tested by determining whether the users were able to complete the first five levels of the app.

Materials and Methods

Figure 1 (left): This is the "Multiplayer ABCs" app that was improved to increase engagement levels.

Figure 2 (right): This is an example of a typical question within the app. The sound of a letter is played, and the user must select the corresponding letter from the options provided.



Materials and Methods (continued)

Designed to help children who are non-native English speakers become literate in English, the "Multiplayer ABCs" app, as seen in Figure 1, underwent improvements aimed at increasing the average number of levels completed. All code was written using JavaScript in Visual Studio Code and was built on the React Native framework, specifically for Android devices. The content of this app is identical to that of "Feed the Monster," a language learning app created by Curious Learning. An example of this content is shown in Figure 2. The main difference is that "Feed the Monster" is a single player game, while "Multiplayer ABCs" is a multiplayer game.

First, an online Firebase database was created and linked to the "Multiplayer ABCs" app. This database was used to collect information, such as the number of levels completed and time spent on each level. Minor changes were then made to the aesthetics, such as correcting typos and fixing issues with alignment. The largest improvement made to the app was the creation of a new team mode that would allow multiple children to play together on a single device. The improved version of the app was then uploaded to the Google Play Store and tested for functionality. The major steps of this project can be seen in the flowchart in Figure 3.

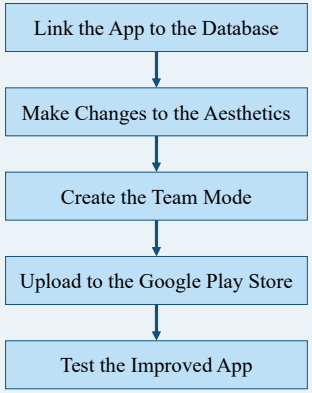


Figure 3 (left): A flowchart detailing the major steps of this project.

Results

In order to increase the engagement levels of "Multiplayer ABCs," a team mode was created, as seen in Figure 4. The improved app was tested for functionality by 10 students from Aberdeen High School, two testers from Pakistan, and one tester from Nigeria. A test was successful if the subject was able to complete the first five levels of the app given a set of instructions. Originally, multiple stages of testing were planned, but due to time constraints, only the individual mode, with the updated aesthetics and the new database, was tested.

Results (continued)

Although there were a few minor bugs, such as the game lagging, text boxes being cut off, and some buttons being too large, as seen in Figure 5, all of the testers were able to successfully complete the first five levels.

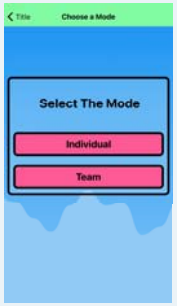
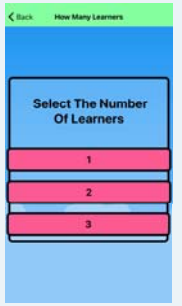


Figure 4 (left): This is an example of a new screen that was created through the addition of the new team mode. The improved app gives the user the option to select which mode to play in.

Figure 5 (right): This is an example of a screen where the buttons were too large.



Conclusions

The purpose of this project was met, as improvements to the "Multiplayer ABCs" app were made, including changes to the aesthetics and the addition of a new team mode. Although a team mode was added, the effectiveness of this change was not tested due to the lack of time. The next step would be to determine the effect of this feature by comparing the average number of levels completed between the original and improved app. Furthermore, the bugs found in this newer version would also be fixed. The results of this project could be used to help increase the engagement levels in educational software.

References

Partovi, T., & Razavi, M. R. (2019). The effect of game-based learning on academic achievement motivation of elementary school students. *Learning and Motivation*, *68*(1), 27–36. https://doi.org/10.1016/j.lmot.2019.101592

Ronimus, M., Kujala, J., Tolvanen, A., & Lyytinen, H. (2013). Children's engagement during digital game-based learning of reading: The effects of time, rewards, and challenge. *Computers & Education, 71*(1), 237–246. https://doi.org/10.1016/j.compedu.2013.10.008