

WorldlyMobile: App for Android

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Final Report

Introduction

Our goal was to create a game-based application that helps students of all ages learn how they memorize most effectively. One of the most common problems being discussed by educational stakeholders - including ministries of education, school administrators, teachers, parents and students - is what type of things should students be learning in the 21st century when information is readily available via the web? Educational researchers are tackling this problem by focusing on understanding what transferable skills students will need to acquire through their education. WorldlyMobile is one prototype that aims to allow students to develop their own memorization strategies through a cycle of events that includes exploratory learning, testing their memorization strategy in gameplay, and then presenting them information on their performance that is associated with overall memorization skill and particular performance associated with various content. The overall goal of using this app is for users to develop their own memorization strategies with the by-product of learning about different countries in the world. The gameplay portion of the application uses an incremental progress bar where students are presented with questions increasing in difficulty as they respond correctly; if students respond incorrectly, the question difficulty will decrease. In this game, there is no visible trace of “leveling up” because we want students to focus on their memorization strategies rather than how much knowledge they have acquired. Theoretically, app use will increase a student's understanding and practice of their transferable memorization skill because of the increasing complexity of questions and the progressive cycle of learning, testing through gameplay and skill proficiency.

This app lies at the intersection of educational research in the fields of technology, psychology and play where it has been identified that there is a lot of potential for changing the way students learn from kindergarten through to the end of high school. The cyclical and progressive model incorporated into the various sections of the app emphasize exploratory and play-based learning where students maintain agency in learning by focusing on developing transferable skills and acquiring various types of content knowledge. Gameplay incorporates various types of questions that have varying difficulty but increasing the number of possible answers. For example, multiple choice questions with 4 possibilities are considered simpler, more difficult multiple choice would have 6 or 8 possibilities. We also chose to include different types of questions - these are multiple choice, matching, and selecting from a list - that test a users' memorization strategies differently. This variability allows the user to develop various memorization techniques that are constantly being tested in gameplay. We are interested in conducting field testing to

see if this app can help students develop effective memorization strategies that are transferable in different contexts. All of the game-based mobile applications on the market about geography aim to test users' accuracy which is why there is such a focus on the content. We have shifted the focus to skill development, which means that if this model is useful in developing memorization skills in users, then the content being incorporated can vary from geography to science to art.

Overall Design

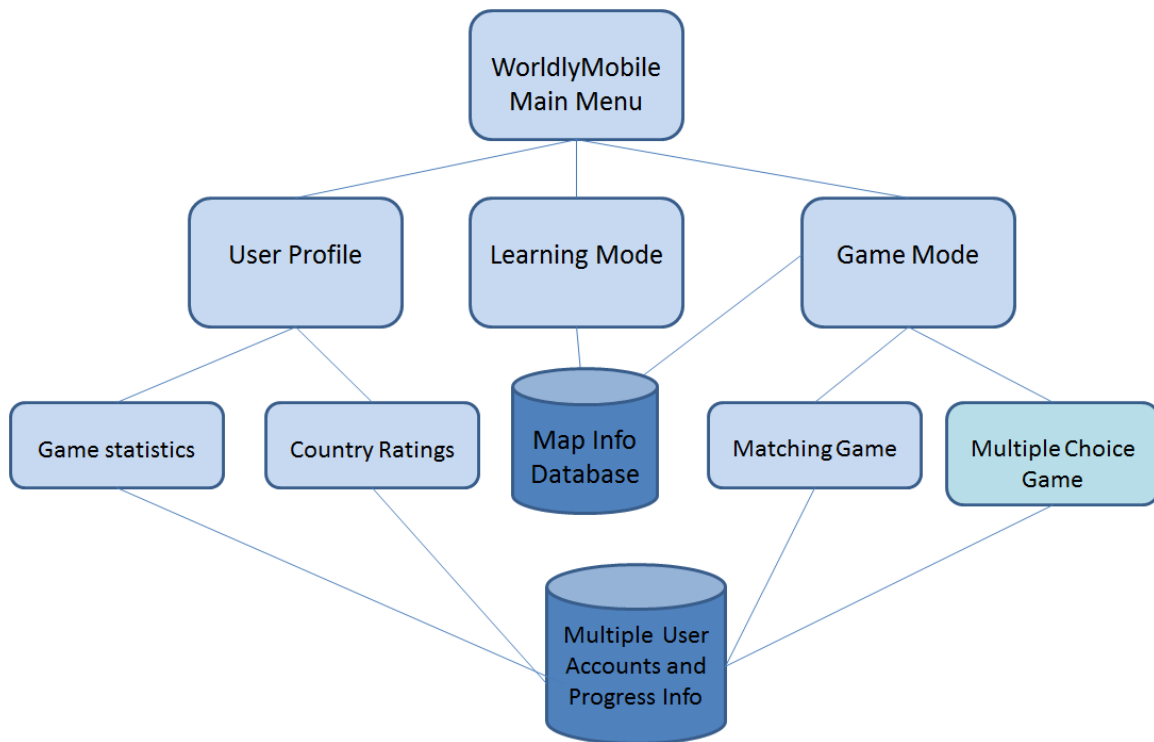


Figure 1: Block diagram of WorldlyMobile

Module Description

- 1. WorldlyMobile Main Menu:** This is the main menu of the application. A user first needs to select his profile or creates a new profile. After the profile has been chosen, the user has access to learning mode and game mode.
- 2. User Profile:** The profile of a user provides him feedback on his performance in game mode. It has further been categorized to game statistics and country ratings modules.

3. **Game Statistics:** This module presents the scores of the user in game mode in a form of graph. The graph is plotted with number of games on X-axis and the accuracy of the user on Y-axis.
4. **Country Ratings:** This module provides a feedback to the user on his performance for each country. The feedback is provided in the form of ratings. Higher rating indicates a better performance.
5. **Learning Mode:** The module which takes care of the learning mode present in this application. It comprises of two screens. First screen is the map screen which provides access to the world map to the user. The second screen is the country information screen which displays the country specific information.
6. **Game Mode:** The module which takes care of the game based activities present in this application. Game mode has intelligence built into it to select the type and complexity of the questions based on a user's progress. Haptic feedback is provided to the user when the answer is not correct. A positive feedback is provided with a notification sound when the correct option is selected.
7. **Matching Game:** In matching game, a user matches the elements in the left column to the elements in the right. The options vary between country names, flags and capital names.
8. **Multiple Choice Game:** In multiple choice game, a question is asked to user and user selects one of the multiple choices as an answers. The questions and the number of options are based on the user's current progress.
9. **Map Info Database:** The database which stores the information about countries, such as capitals, flags, map images etc.
10. **Multiple User Accounts and Progress Info:** The database which stores information regarding multiple users and their progress in various game modes.

Functionality & Screenshots



Fig: Main menu of WorldlyMobile

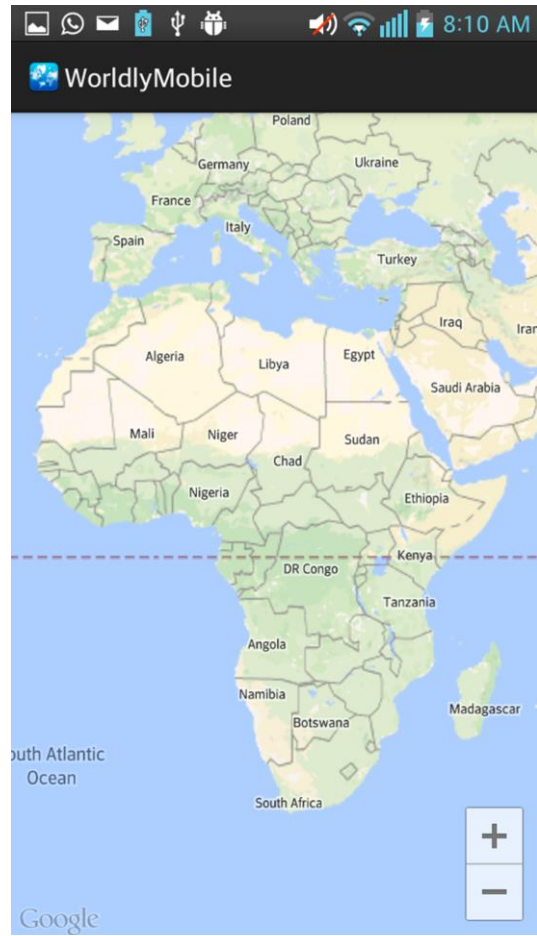


Fig: Map screen of leaning mode.



Fig: Learning mode screen displaying country specific information

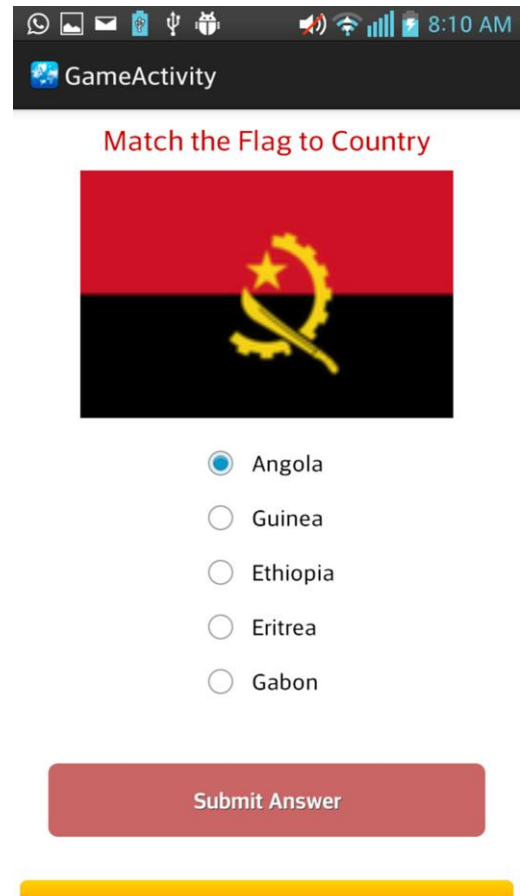


Fig: Game mode. A multiple choice question is displayed.

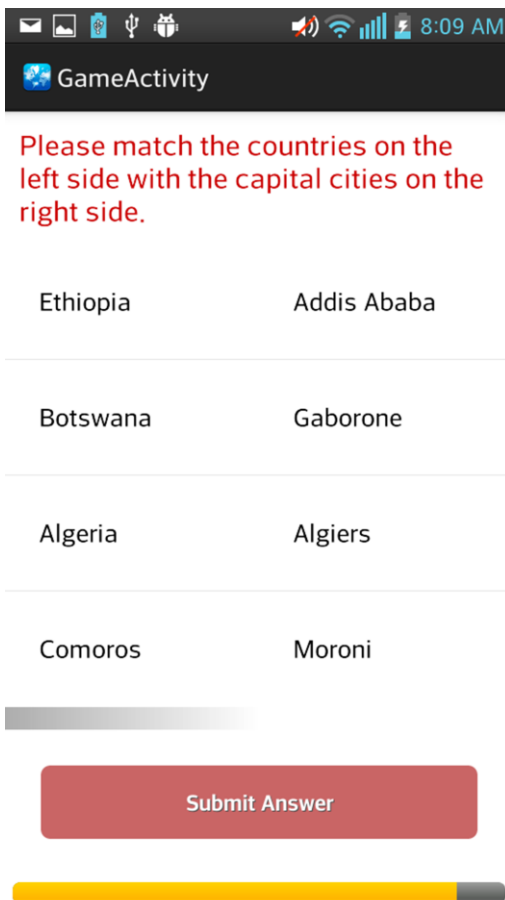


Fig: Game mode. A list-match question is displayed.

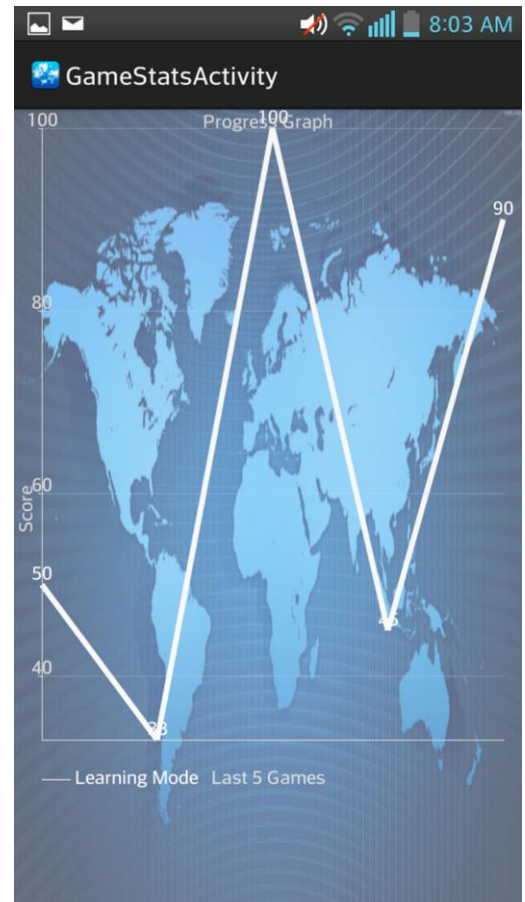


Fig: Game statistics. Shows the user performance in last 5 games.

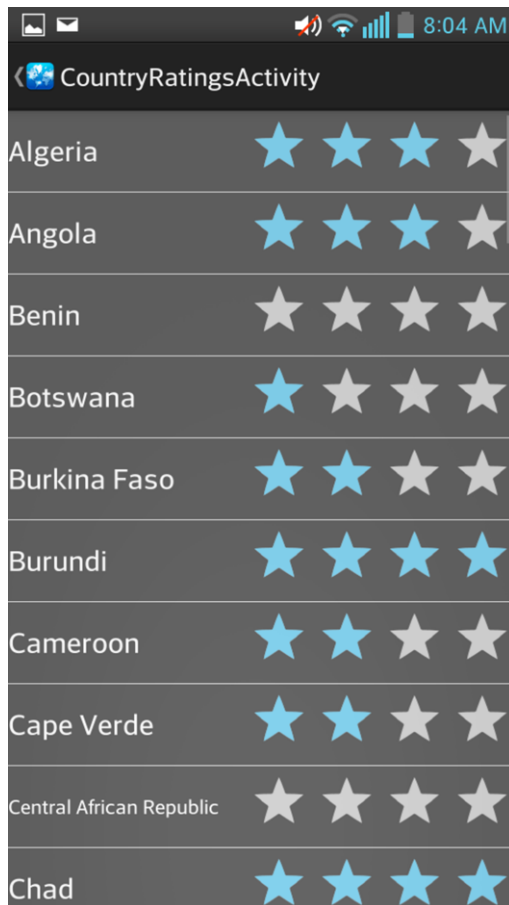


Fig: Country ratings. Shows the user performance for specific countries.

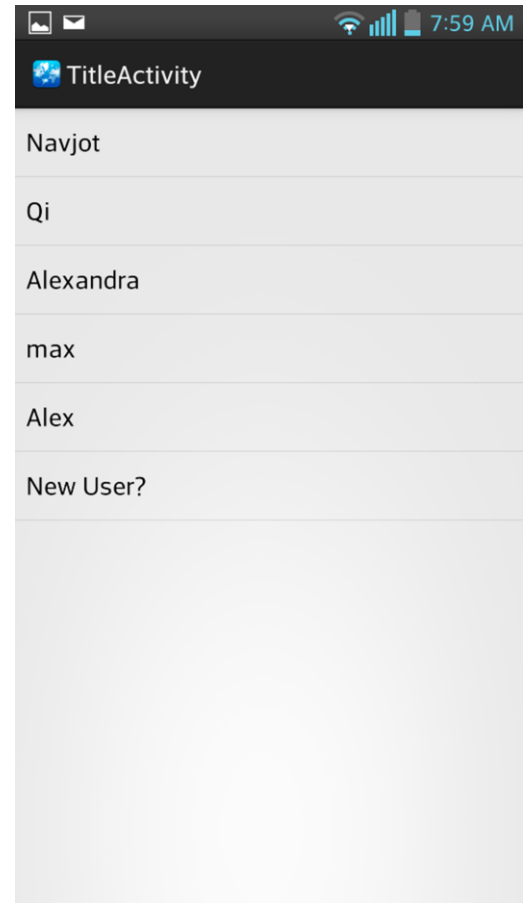


Fig: User selection menu. Select existing user or create a new one.

Key Learnings

Learning Models: We have used an incremental learning model based approach to design the game play for this application. This choice was based on the expert knowledge received from our apper for this application. However, a better approach would have been to test and ensure the effectiveness of this model before incorporating it into the game play. It would have also been interesting to compare its effectiveness with some of the alternate learning approaches.

Effective targeting of potential Users: We started this project with students as our targeted Users. However, we did not incorporate any special considerations for our targeted Users during the development phase. More time could have been spent on designing the game play and GUI of the application to make it more appealing to our targeted users.

Improvement in Game Play: In the development of the gameplay algorithm, we currently focus on accuracy and the level of difficulty to select which type of question comes up next. In order for gameplay to be more robust, we would like to incorporate information on user performance associated with the different types of content. This will provide more personalized gameplay. For example, if a user keeps selecting incorrect answers when particular countries are in question, then more questions about these countries will be integrated into gameplay. Theoretically, this more advanced algorithm will help users refine their memorization skills because of the increased probability of specific content.

Handling the map objects more efficiently: Our initial plan was to uniformly Google Maps API in our application. This would have provided better interaction with maps for the users and also a uniform application GUI with respect to maps. However, during the course of development we learned that not all features available on Google Maps are implemented for the mobile version. We could not have obtained country specific maps from the API without writing a significant amount of code by ourselves. This forced us to use images instead. If the development cycle was longer, we would have liked to remove the dependency on images and work solely with Google Maps.

Individual Contributions

Alexandra: I was responsible for the development of the application's gameplay model and the progressive learning cycle that was implemented. I mocked up the screens for the app and provided Navjot and Qi with the content resources for the geography information that the app was populated with. I was responsible for providing information on the different elements to incorporate into gameplay (e.g. the positive and negative feedback that a user is given) based on my understanding of the literature in my field.

Navjot: I was primarily responsible for the learning mode and user profile section for this application. I set-up the various resources required by the application which include the databases, flags and map images. I also implemented the multi-user functionality for this application.

Qi: I was mainly responsible for the game mode for this application. I implemented the multiple choice questions and list matching questions for the game mode. I also implemented the approach used to track the user's progress and an algorithm to vary the type and complexity of questions accordingly.

Future Work

Adding audio hints and prompts: We believe audio hints and prompts would be an interesting addition to the game mode of this application. Incorporating these into game play can make the learning process more effective and efficient.

Test the progressive learning approach: Testing the progressive learning approach as incorporated in the game play with actual users is very important. An ideal approach to test this approach would be to distribute the game to users and further collect and analyze their performance data. The users should be further divided into different age groups and the effectiveness of this approach can be compared between age groups as well.

Reward Points: The current version of the application only provides scores as reward points. The future versions can have more interesting reward points such as badges or ranks to make the gameplay more engaging.

Social Integration: The game-mode can also be integrated with the social media platforms such as Twitter and Facebook. This would provide a way to users to easily share their achievements with their friends. As social media platforms are very popular among students, it will also help us targeting them more effectively.

Note: We are willing to share the final report, the video presentation as well as the source code produced during the course of this project.