CS 6460 Educational Technology

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Project Proposal

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Introduction

In my previous assignments, I have explored how *Technologies* can augment educational experiences. I have explored four areas of education technologies that I am particularly interested in: intelligent tutoring systems, game based learning, mobile devices and simulation based learning. Upon further inspections of these four areas of educational technologies, I have determined that I would like to be in the development track using one of these technologies or amalgamation of the four technologies as multi-channel learning experience.

I have explored areas where my interest of using multi-channel leaning experiences can be leveraged to contribute to education technologies ecosystem particularly for preschool kids. After reviewing the existing educational marketplace for preschool kids, I have decided to build a high-fidelity prototype (M. Walker, 2002) of *an interactive mobile app for kids to learn geography* as my project idea. This will be an **individual project** in the **development track.**

Problem Domain

My inspiration for building *an interactive mobile app for kids to learn geography* for children came from traveling with my own kid. We have a 2-year toddler who has an iPad which we use quite extensively for him while traveling. In our recent trip to California (San Diego), I thought it would be nice to have a mobile app that he can use while get some geographic information about California in an interactive kid friendly way.

Huizega et el research demonstrated that use of mobile games in education combines active learning with fun. Their research tracked the effects of a mobile city game called Frequency 1550, which was developed by The Waag Society to help students in their first year

of secondary education playfully acquire historical knowledge of medieval Amsterdam. The benchmark of the research was student engagement in the game, historical knowledge, and motivation for history in general and the topic of the Middle Ages in particular. A quasi-experimental design was used with 458 students from 20 classes from five schools. The student in 10 of the classes played the mobile history game whereas the students in the other 10 classes received a regular, project-based lesson series. The results showed those students who played the game to be engaged and to gain significantly more knowledge about medieval Amsterdam than those pupils who received regular project-based instruction (Huizenga, 2008)

Existing Product in the Marketplace

To find existing mobile apps that offers *kid's geography education* I have conducted a search in iOS App store with keyword 'kid's geography education app' and got less than 100 apps as results. From the result set, to take a deep dive into existing products in the marketplace, I have selected one app developer (*Free Cloud Design Inc.)* who has high user rating (above 4 out of 5-star rating based 100+ user) for their app, *Stack the States*. Here're some of the screenshots from that app:

Even though the app has few features that are attractive but it has few weaknesses, notably:

- The app put too much emphasis into game based learning. From our course lesson lecture on Mobile Devices, Jesse Uelmen, program manager of Udacity, at her interview with Dr Joyner points out that most developer put too much efforts to build gamification into mobile app education technology for which is often difficult get it right. This app seems to follow that same pattern where it incorporated unnecessary gamifications such as including time based campaign.
- The app does not use geo location based services even though it's a geography based app. This prevents the app from providing real time geography lessons about a locality the user is currently visiting. Roger Down's research shows that geospatial (i.e. relating to or denoting data that is associated with a particular location) technologies offer the chance to revolutionized the trajectory of K-12 (5-18 years-old) geography education (Downs, 2016).

Because of the lack of kid's geography education mobile app with features I am interested in, I have decided to pursue building a high-fidelity prototype of *an interactive mobile app for kids to learn geography* as my project idea.

Minimum Viable Product

The interactive mobile app I like to build will offer the ability to color states in a canvas based on United States map. I propose the name of the app as ***ColorMyStates***. Following are the features of the Minimum Viable Product for ***ColorMyStates***:

- ***Geo-Location***: The app will incorporate challenges and curiosity aspect of learning by presenting quizzes on the previously visited states based on geolocation. According to a research on game based learning, computer games that provide challenge, include elements of fantasy, and rouse the curiosity of the learners are intrinsically motivating (Malone, 1980).
- ***Geo-Mapping***: The app will include element of controls as an immersive learning experience by providing ability to select states in the United States map canvas. Research by Lepper suggests that young learners should have opportunities for making choices about instructionally irrelevant aspects of the activity such as types and names of characters and fantasy elements to truly involve in the learning (M.R. Lepper, 1987).
- ***Geo-Drawing***: The app will include simulated puzzle based learning by incorporating the ability to draw on the United States map canvas. Puzzle-based learning is an in-progress experiment that seeks to foster general domain-independent reasoning and critical thinking skills that can lay a foundation for problem-solving in future educational activity. As fun as puzzles inherently are, they provide only a means to this pedagogical end. A study indicates that students who enroll in puzzle based courses perceive an improvement in their thinking and general problem-solving skills. (Falkner, Sooriamurthi, & Michalewicz, 2010)

Technical Details

- Use https://www.invisionapp.com to build the UX design and low fidelity prototype of the app
- Use Ionic (http://ionicframework.com) as my development framework
- Use Angular (https://angular.io) as programing language of choice
- Use Cordova (https://cordova.apache.org) as my platform

- Use git as code repository (https://github.com/maksoodmohiuddin/)
- Target iOS and Android platform
- Use Cordova/Ionic Plugin (e.g. https://www.npmjs.com/package/cordova-plugin-geolocation) for Geo-Location
- Use Cordova/Ionic Plugin (e.g. https://www.npmjs.com/package/cordova-plugin-googlemaps) for Geo-Mapping United States Map as Canvas
- Use Cordova/Ionic Plugin (e.g https://github.com/blinkmobile/cordova-plugin-sketch) for Geo-Drawing
- Use AWS for IAAS (Infrastructure as A Service), prepare product demos and distribute high fidelity prototype of the app

Design Considerations

Mobile apps have been recognized as valuable educational tools for young children. One of the main reason for that is easy accessibility and availability of mobile devices. Noorhidawati et el. studied three main learning notions for young children that can be used to teach them in informal learning setting (i.e. without teacher engagement): cognitive, psychomotor and affective (A. Noorhidawati., 2015). In my design, I will incorporate the informal learning as one the core learning process.

Careful attention should be paid to the design and content of mobile apps. To design the kid's geography learning app, I plan to use the following design guidelines drawn from the research by Garry Fallon (Fallon, 2013):

- Communicating learning objectives in ways young students can access and understand;
- Providing smooth and distraction-free pathways towards achieving goals;
- Including accessible and understandable instructions and teaching elements;
- Incorporating formative, corrective feedback;
- Combining an appropriate blend of game, practice and learning components;
- Providing interaction parameters matched to the learning characteristics of the target student group.

Project plan, tasks and deliverables

I plan to follow Agile Scrum Methodologies for the project work with 1-week sprint for 6 sprints (6 weeks). My current estimate is that the project will take 120+ hours to complete and have broken down each week's tasks into maximum of 22 hours weekly workload. Following is the complete sprint planning. Note that, I am using an online Agile Board (https://trello.com) to track my project and screenshots from the board are in Appendix A of this project proposal.

Sprint 1 (Week of 6/19/17): Weekly Status Check 1 Deliverables
UX Prototype of the Minimal Viable Product and solicit feedback from mentor (5 Hour)
Review and complete any trainings for the selected technology stack (10 Hour)
Complete Development Environment Setup (4 Hour)
Research work, write-up weekly Status Check 1 & peer reviews (3 Hour)

Sprint 2 (Week of 6/26/17): Weekly Status Check 2 Deliverables
Complete the low fidelity prototype of the Minimal Viable Product with incorporating feedback from mentor and solicit feedback from classmates (5 hours)
Complete project code scaffolding (5 hour)
Feature Development Code Deliverables: Geolocation (6 hour)
Research work, write-up Weekly Status Check 2, Intermediate Milestone 1 & peer reviews (6 Hour)
Intermediate Milestone 1 will include all works from Sprint 1 & 2.

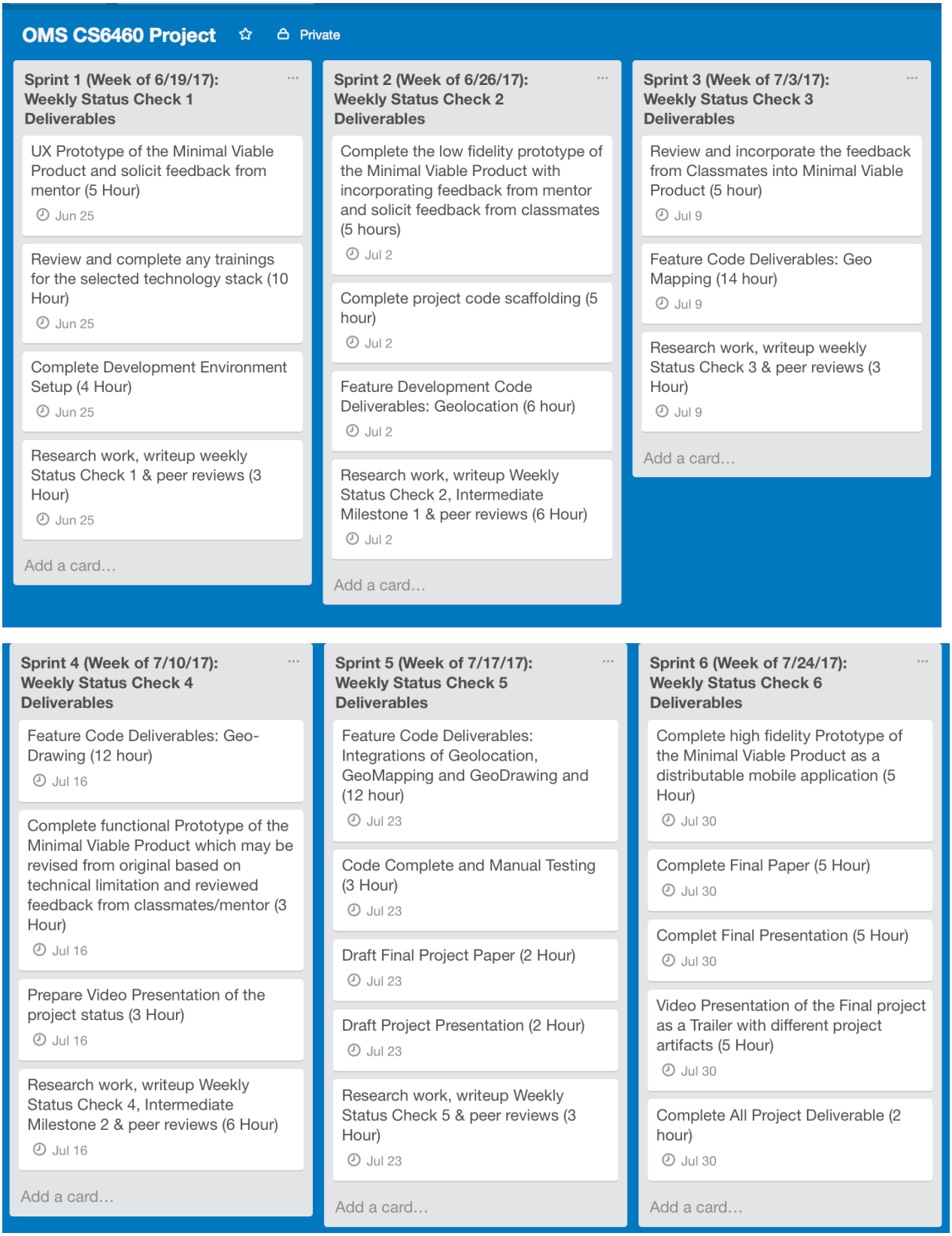
Sprint 3 (Week of 7/3/17): Weekly Status Check 3 Deliverables
Review and incorporate the feedback from Classmates into Minimal Viable Product (5 hour)
Feature Code Deliverables: Geo Mapping (14 hour)
Research work, write-up weekly Status Check 3 & peer reviews (3 Hour)

Sprint 4 (Week of 7/10/17): Weekly Status Check 4 Deliverables
Feature Code Deliverables: Geo-Drawing (12 hour)
Complete functional Prototype of the Minimal Viable Product which may be revised from original based on technical limitation and reviewed feedback from classmates/mentor (3 Hour)
Prepare Video Presentation of the project status (3 Hour)
Research work, write-up Weekly Status Check 4, Intermediate Milestone 2 & peer reviews (6 Hour)
Intermediate Milestone 2 will include all works from Sprint 1, 2, 3 & 4.

Sprint 5 (Week of 7/17/17): Weekly Status Check 5 Deliverables
Feature Code Deliverables: Integrations of Geo-Location, Geo-Mapping and Geo-Drawing and (12 hour)
Code Complete and Manual Testing (3 Hour)
Draft Final Project Paper (2 Hour)
Draft Project Presentation (2 Hour)
Research work, write-up Weekly Status Check 5 & peer reviews (3 Hour)

Sprint 6 (Week of 7/24/17): Weekly Status Check 6 Deliverables
Complete high-fidelity Prototype of the Minimal Viable Product as a distributable mobile application (5 Hour)
Complete Final Paper (5 Hour)
Complete Final Presentation (5 Hour)
Video Presentation of the Final project as a Trailer with different project artifacts (5 Hour)
Complete All Project Deliverables (2 hour)
Final Milestone will include all works from all Sprints.

Appendix A – Agile Board in Trello



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