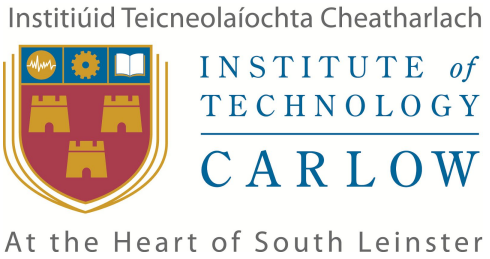

Computer Games Development
SRS
Year IV

DION BUCKLEY
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May 03rd 2020

Faculty of Science

Department of Computing and Networking

Open-Book and Remote Assessment Cover Page

Student Name: Dion Buckley

Student Number: C00220868

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Module: Project II (Games)

Stage/Year: Final

Date: 02-05-2020

Declaration

This examination/assessment will be submitted using GitHub/Google Drive as the online submission tool. By submitting my examination/assessment to GitHub/Google Drive, I am declaring that this examination/assessment is my own work. I understand that I may be required to orally defend any of my answers, to the lecturer, at a given time after the examination/assessment has been completed, as outlined in the student regulations.

Contents

Overview

Philosophy

Philosophical point #1

The software is trying to affect long term behaviour change via engagement with a quiz part of a health app to help young celiac patients achieve dietary compliance. If this works we could change the landscape of potential management for this disease in a large scale.

Philosophical point #2

This software will only run on mobile devices (android being the main focus with potential to expand to iOS later) and the reason being that my project runs in tandem with two other students in the class and we will all combine our components into one final app at the end so we need to keep things standardised.

Also I think a lot of the focus studies from last year (as mentioned in the research doc this project is a two year project) show that teenage coeliac patients are not looking for a webapp they are only likely to engage with this content in the form of a mobile app - enter React Native.

Common Questions

What is the software?

The software is a component of a health app with one specific goal: encourage long term behaviour change (dietary compliance) in teenage coeliac patients. This component is the knowledge component and has an even more specific goal: find ways to keep users **engaged** with the learning portions of the app. i.e text information, quiz and hopefully videos as well.

Why create this software?

I am creating this software for the high potential it holds in relation to having large scale positive impact in the world. There is definitely a hole in the market and I can try to fill it without feeling morally conflicted.

Where does the software take place?

The world in which this software takes place is one of frustration and pain. Frustration due to there being no easy cure for this awful ailment. Pain due to the ease at which outside factors can affect the patients even if they stick to the only and very difficult diet we continue to mention. What I refer to here is things like cross contamination of gluten, whereby very easily a restaurant can serve a gluten free meal which has been contaminated by even the

most miniscule amounts of gluten, thereby adding to the frustration and pain that the patient feel because even when they stick the diet the world somehow messes it up for them.

So we enter into a fairly dark world here and we attempt to bring light to that world through effective education around managing all of this.

What do users do in the app?

Read text form information educating about the diet and cross contamination and all the related necessities. Take quizzes to test this knowledge and help to solidify the long term learning. And hopefully if we can get them made also watch simple but effective animated videos to even further solidify learning and really keep users engaged.

How many characters do I control?

No controllable characters, just UI elements. There is a license free Owl mascot on the home page however representing Knowledge.

What is the main focus?

The main focus is quite clear for the user here; learn more about coeliac disease and look to apply that learning in the day to day struggles of the affliction. Whether that learning comes from the engaging videos or the gamification elements or the structure of the quiz itself is not as important as the ultimate goal of learning.

What's different?

There is not a huge amount of coeliac health apps on the market right now. But what there is tends to be a lot of restaurant finders, ingredient pickers and things like that. I couldn't find even one app targeted specifically at education of coeliac patients about their own disease.

So I can certainly say my app differs in that regard, it's more of a solidify the basics of how to act or potential for action, before going into specific ingredients or restaurants. It's sort of like a step one for coeliacs who feel completely lost or haven't been taking it all that serious.

Define the Application

The application is a component for a mobile health app designed to assist in the formulation of long term behavior change around coeliac dietary compliance in teenagers. This component will seek to engage the users using proven behaviour change techniques mapped on to gamification elements.

The app will be made up of a number of screens, from landing page, to video selection to video player, from badge system to quiz, all living on a screen stack navigator. Some parts are already done, some need to be completed but the basic structure with placeholder screens currently in place.

The workflow from now on is essentially to pull different simple components from other places and use them to build up the rest of the screens, stuff like custom buttons and the like. If I follow the designs from the Austrian students at Amsterdam week by the end I should have a very polished looking and feeling application.

Feature list:

Feature 1: Video Player

A native video player has been implemented with professionally made gluten information (spanish health board approved - Dr Alfonso) videos being loaded, played and unloaded locally in an asynchronous fashion.

Feature 2: Badges

Badges will be implemented similar to an achievement list or a shop in video games. Users will be able to see the badges they have earned and spend them on bonuses. When a badge is earned it will show up in the form of an alert with some pleasing sounds and particle effects. The screen behind will pause state (if it has a state) and darken at this time.

The badge system will be designed similarly to how the Austrian students designed it in Amsterdam (see figures below). I will have to achieve this somewhat manually, laying out different, simple components on the badge screen within the app.

~~*Feature 3: Progress towards Mastery*~~

~~Users can work towards mastery within the app. This will have three milestone stages; Novice, Disciple and Master. The amount of learning undertaken through reading, watching and taking quizzes along with regularity of login will earn the user points towards mastery. At each milestone the user will unlock new abilities such as hints for the quiz or the ability to continue the login streak without logging in at all for even up to three/four days.~~

Feature 3: Quiz

Quiz will follow a similar structure to last year but rebuilt for native with much of the old code scrapped or completely re-written. Gamify the quiz with coins, boosters, streaks, better particles, sounds effects and hint that the coins can be used elsewhere on a post quiz screen.

Questions and answers will be stored on a google drive using system architecture described to retrieve this data.

Feature 4: Stack Navigator

Stack Navigator will be needed to display different screens and pop the most recent one upon back press from the user. Special way to pass props using this design will be looked into and similarly learning how to use js callback methods to retrieve data back from react child components must also be done to allow correct data flow through the screen

What is the application supposed to do

- Video player can be accessed with multiple short informative videos to increase learning and interest
- Quiz can be accessed from the menu
    - Quiz will have gamified elements
        - can earn badges here to spend later
    - Information about the ailment will be shown to the user here
- Gamified badges can be viewed and spent on bonuses
    - There is an in app bonus - for us within the quiz to allow one wrong answer upon a hot streak while retaining the streak
    - Potential real world impact bonus - pending approval these coins can be used to get a discount on the new gluten detection stick (recently released and affiliated with Dr. Alfonso who started this project)
- Loading indicator, sound effects and particle system
- **Persistence** upon app exit
- Stack navigator plus extra back handling and alert

Who is going to be using this application

[Teenage] Coeliac patients.

Use Case

User has consumed gluten and has decided enough is enough, the symptoms are unbearable and they cannot control themselves. They look to the app store for some solution, something to help guide them and hold them together on this difficult journey, they discipline themselves over time and see improvement, associated with the app, they recommend it to all their coeliac friends.

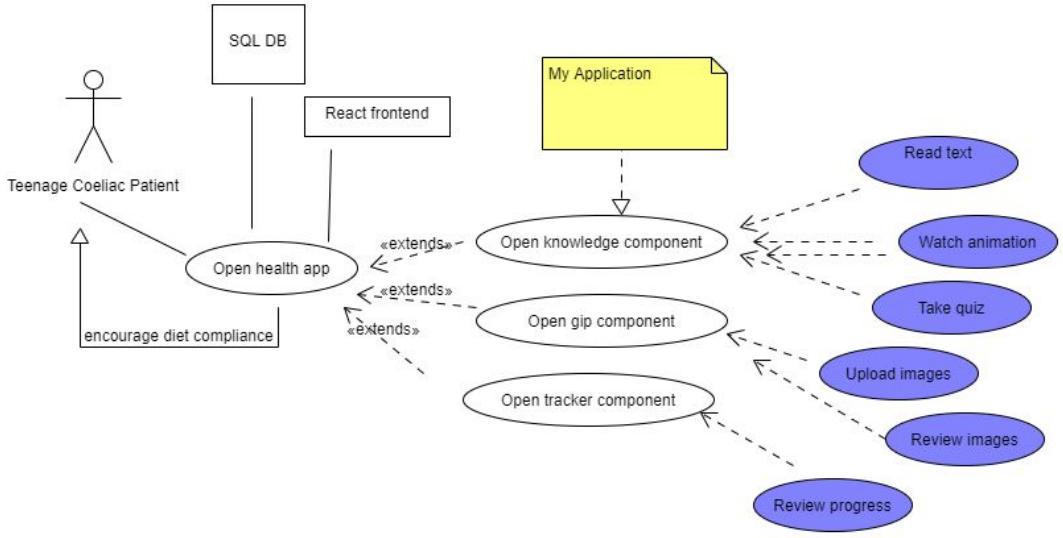
Metrics

These things will be logged over the 21 day challenge (Covid-19 stopped this):

- Time spent on app

- **Points / progress towards badges - this is the main metric now with coins earned being the measure for success**
- Regularity of login (daily, weekly, monthly)
- Which page of app has most time spent on

Context Diagram



Is there a precedent for this application? (Your inspiration)

Yes, this application takes over from last year as it is part of a two year Erasmus+ project so there has been a lot of hands on overall and my specific component has some previously implemented information and quiz sections. This application will improve / differ here with further incorporated behaviour change techniques (BCTs) and gamified elements such as badges and points.

For the BCTs we can look at this using the Theoretical Domains Framework (TDF) (Lavallée et al. 2018) and how this frame has been mapped onto diet tracking apps (Ferrara et al. 2019) to see that some of the most widely used BCTs in other apps from most to least used are as follows; ‘Beliefs about Capabilities’, ‘Social / Professional Role and Identity’, ‘Reinforcement’, ‘Intentions and Goals’ and ‘Knowledge’. This ordering is important for my application as going off this study we can see that knowledge alone is only the fourth most used BCT of the apps included. I find this interesting because it means two things.

Firstly, even though there is some precedent to using knowledge as a BCT there is still a gap to be filled in these kinds of apps in using this BCT. This allows me to push further than if my application was focused mainly around Beliefs and Capabilities it may be more of following the clear path laid out with less room for creativity.

Secondly and as a counterpoint, even though this application is focused around knowledge I will need to find ways to incorporate the more widely accepted or used ‘more effective’ BCTs. This is where I believe something like the animations and gamified elements can come into play, while the animations ultimately provide easier access to the knowledge, these kind of upbeat style explainer character videos - along with progress towards badges with points added throughout the whole app - should instil in the viewers a sense of belief in their own capabilities, deeply reinforce the learning and provide them with more clear intentions and goals.

Design Manual

1. The application will be used on a mobile phone, using thumbs and or outer reaches of fingers to scroll, zoom, tap etc.
    a. Red zones (hard or near impossible to reach areas of different screens and different hand sizes) will be considered
    b. The app can be used with one hand but more efficiently using two hands
    c. Ideally used in portrait mode but landscape scaling will be considered.
2. *Making screenshot mocks using this https://balsamiq.com/wireframes/desktop/# or from https://i.pinimg.com/originals/8b/32/9c/8b329c2d578ae0f17ef936d6897b71d2.jpg*

Figure 1. Video playback mock screen

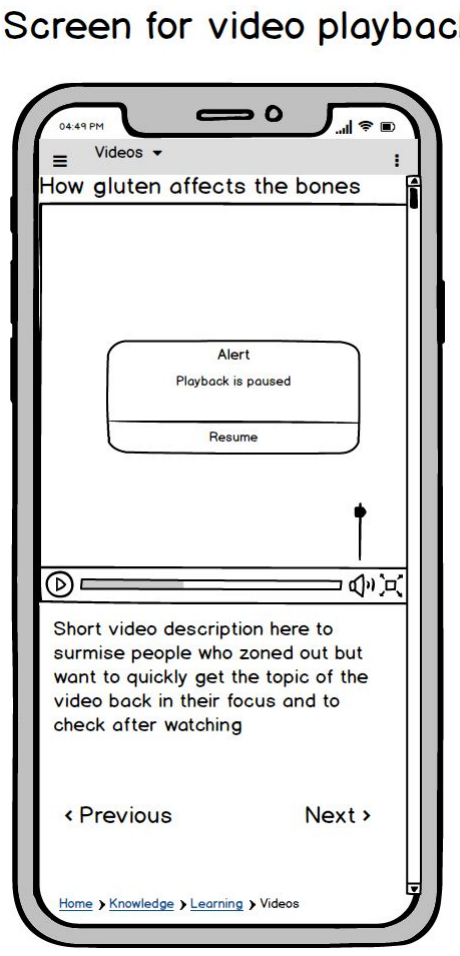


Figure 2. Badge (coin) mock screen

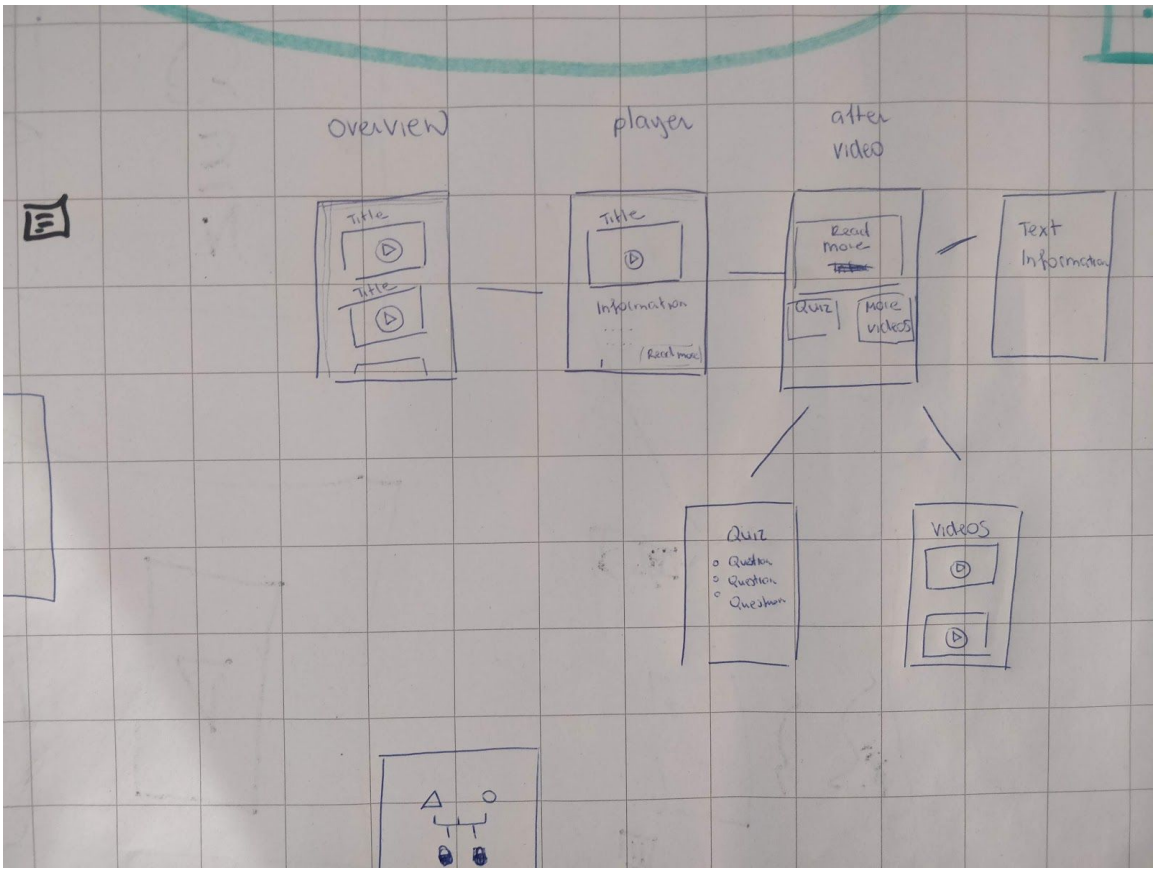


Fig 3. All basic screens necessary to build my app (from Erasmus+ C6 design session)

3. Shared SQL database and python with Flask backend along with a React native frontend to be designed by my application (in sync with the other two students on the Irish side of the Erasmus+ project mentioned for this year
4. My project will function like so:
    a. User can boot application
        i. User can access video information
        ii. User can take a quiz
        iii. User can earn badges and points towards mastery (**coins**)
    b. User can access other parts of the Erasmus+ project app (not defined here)
    c. User can exit app but coins will **persist**
    d. The desqol GDrive is integral to the functioning - without those questions being on there in the correct format I would have no updated medical questions to use in the quiz.
    e. The health students questionnaire and the feedback we all gave to them on it is integral to the study
    f. Node.js and it's npm packages are needed for function along with expo cli for ease of booting
    g. My mobile phone or an emulated one is vital to testing functions and demo

References

Lavallée, Jacqueline F., Trish A. Gray, Jo Dumville, and Nicky Cullum. 2018. "Barriers and Facilitators to Preventing Pressure Ulcers in Nursing Home Residents: A Qualitative Analysis Informed by the Theoretical Domains Framework." *International Journal of Nursing Studies* 82 (June): 79–89.

Ferrara, Giannina, Jenna Kim, Shuhao Lin, Jenna Hua, and Edmund Seto. 2019. "A Focused Review of Smartphone Diet-Tracking Apps: Usability, Functionality, Coherence With Behavior Change Theory, and Comparative Validity of Nutrient Intake and Energy Estimates." *JMIR mHealth and uHealth* 7 (5): e9232.