Ollscoil na hÉireann, Corcaigh
National University of Ireland, Cork

Increasing the UCC ACCESS+ Online Presence with the Creation of a Mobile Application

Thesis presented by
Angie Ring
116328493

for the degree of
MSc Interactive Media

University College Cork
Head of School/Department: Cormac J Sreenan
Supervisor: Dr. Dirk Pesch

2nd October 2020

Word Count: 13,460

Declaration of Originality

In signing this declaration, you are confirming, in writing, that the submitted work is entirely your own original work, except where clearly attributed otherwise, and that it has not been submitted partly or wholly for any other educational award.

I hereby declare that:
- this is all my own work, unless clearly indicated otherwise, with full and proper accreditation.
- with respect to my own work: none of it has been submitted at any educational institution contributing in any way towards an educational award.
- with respect to another's work: all text, diagrams, code, or ideas, whether verbatim, paraphrased or otherwise modified or adapted, have been duly attributed to the source in a scholarly manner, whether from books, papers, lecture notes or any other student's work, whether published or unpublished, electronically or in print.

Name: **Angie Ring**

Name: ANGIE RING

Signed: 

Signed: ____Angie Ring____

Date: **02/10/20**

Acknowledgements

I would like to express my gratitude towards my project supervisor, Dr. Dirk Pesch, for his time, guidance, and support throughout this project.

Second, I would also like to give a special thanks to Mr James Bilson, the UCC ACCESS+ Coordinator, for all his valuable help, feedback, and involvement over the past few months.

Third, I would like to thank Andrea Healy and Robert O'Regan, for doing the voice overs for the ACCESS+ animation.

Fourth, a sincere thank you to all participants involved.

Finally, I would like to thank all my friends and family for their support and kindness over the past three months.

Abstract

This dissertation is focused on the development of a mobile application for UCC ACCESS+. It will also explore questions surrounding access, access programmes, accessibility to third level institutions, and what groups are underrepresented in the university population. The UCC ACCESS+ is a programme focused on supporting the transition of school leaving students from linked Cork City DEIS schools into Further Education (FE). The aim of this application is to be a source of information about UCC ACCESS+ and to increase the programs online presence in the hope that more people become aware of the services. Based on the research I conducted it can be seen that the participants found it easier to find information on the application over the website and generally enjoyed the experience of the application more.

Table of Contents:

Chapter 1

1. Introduction

In recent times, the number of 18-20-year olds pursuing higher education in Ireland has increased from 20% in 1980 to 52% in 2015 (O'Sullivan et al., 2019). The increase in numbers can be attributed to the fact that education is becoming more accessible. People from disadvantaged backgrounds have facilities put in place to aid their journey to higher education.

University College Cork (UCC) has an estimate of 20,000 students which come from an array of different backgrounds. There is also a myriad of ways in which students gain entry to the University. Since the introduction of Post Leaving Certificate courses (PLC) in 1985, students now have the option to use these courses as a gateway to third level education if they do not get enough points in their leaving certificate.

UCC PLUS was aware that a number of students in UCC had come from the PLC route and created UCC ACCESS+ in November 2019. UCC ACCESS+ was designed to support Leaving Certificate students from socio-economic disadvantaged areas who aim to pursue further education with the aim to attend a higher education institution. This resource was put in place as an attempt to promote higher education to people from disadvantaged areas, as their attendance rate to university is much lower compared to that of people from a more privileged background.

The line graph below was produced from a Higher Education Authority (HEA) study based on data from the 2017/2018 academic year. The study was "*A Spatial & Socio-Economic Profile of Higher Education Institutions in Ireland".* The report uses address data from students in the HEA student records system to determine their socio-economic profile. This analysis was taken out for each higher education institute in Ireland except Trinity College in Dublin. Based on the study, it can be seen that 5% of University College Corks students are in the disadvantaged category, while 31% are in the affluent category. The ED maps concluded that the majority of UCC's students come from the South-West, particularly around Cork city, while a few inner-city areas have a lower level of enrolment, particularly in the north side of the city (Higher Education Authority, 2019).

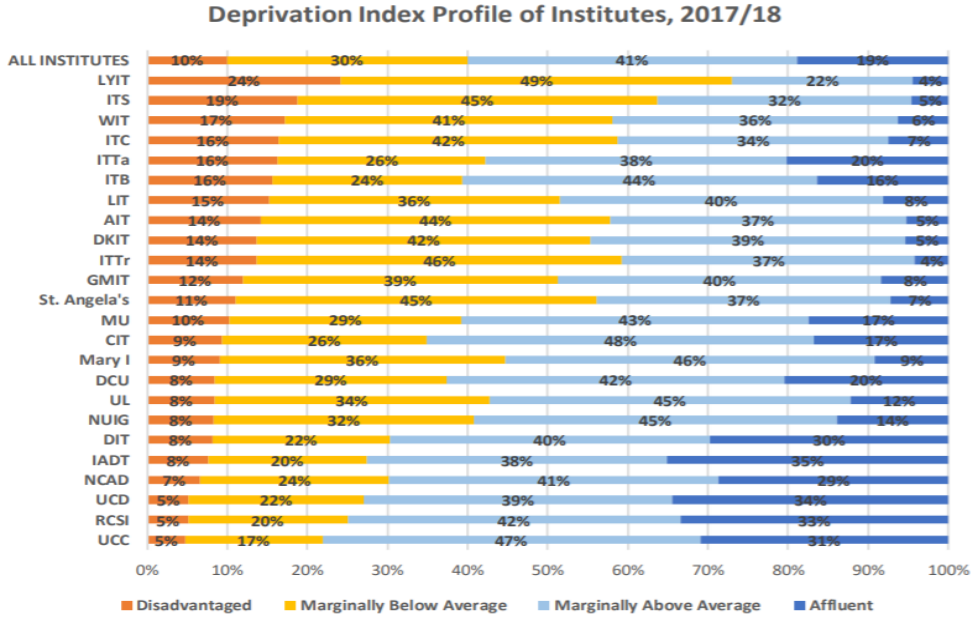


Figure 1: The deprivation index profile of institutes, 2017/2018.

1.1 Project Motivation

Education is a powerful tool that enables every individual to gain, not only knowledge of the world around us, but an insight and perspective into themselves. We have been actively learning since day one from our environment and the people around us. As we grow older, different level of educational intuitions exists, for the sole purpose of providing us with knowledge that we need to progress in life and knowledge that we desire to seek.

With each individual equipped with different skills and a diverse economic and environmental background, it is likely that students have different circumstances and goals in mind and they may not necessarily line up with the usual, Primary School → Secondary School → Higher Education (University, Institution) route. Luckily, programmes such as the UCC ACCESS+ exists to guide and support students throughout their educational journey and eventual progression to a career.

My main motivation for this project is to raise awareness about the ACCESS+ program and determine which medium allows for easy access of information to individuals who are looking to learn more about the program.

1.2 Project Importance:

I believe it is important to let students know that there are other ways to gain entry to a degree or career of choice. Guidance is offered to individuals who wishes to attain access to education that they wish to pursue, whenever they are ready. Whatever the circumstances may be, ACCESS+ will act as a support system to students.

1.3 Project Goals:

The project goal represents the targets that I wish to achieve in this project. By listing out my project goals, I have a clearer picture of the desired outcome of the project.

- Speak to the ACCESS+ coordinator, Mr James Bilson and learn more about the program and discuss expectations and limitations.
- Research literature around the theme: Access in Education.
- Determine how ACCESS+ can gain more online presence.
- Discover the most effective platform to make the mobile application on.
- Decide on what content to showcase.
- Draw draft and eventually finalise the design and UI wireframes.
- Create introductory animation video for ACCESS+ as discussed.
- Build the mobile application.
- Test the mobile application with a group of participants.
- Edit the application based on feedback.
- Eventually publish application on the Google Play store and Apple App store.

1.4 Project Outline:

Chapter 1: Introduction

Chapter 2: Literature Review

Chapter 3: Methodology

Chapter 4: Project Design

Chapter 5: Choosing Development Framework

Chapter 6: Design

Chapter 7: Development

Chapter 8: Implementation

Chapter 9: Testing

Chapter 10: Conclusion

Chapter 2

2. Literature Review

2.1 Introduction

This literature review aims to discover what exactly is access. It will explore themes surrounding access in education under the following headings: providing accessible education, underrepresented socio-economic groups in the university population the UCC ACCESS+ programme.

This research will give me clearer understanding of access and the needs of students from disadvantaged backgrounds, allowing me to determine the best way to reach out to students who would greatly benefit from the ACCESS+ program.

2.2 What is Access?

Access within the terms of education can be defined as *"**the ways in which educational institutions and policies ensure—or at least strive to ensure—that students have equal and equitable opportunities to take full advantage of their education**"*("Access Definition", 2020). Access is linked to disadvantage. The barrier preventing access can be broken into three sections, financial, social, and educational (McMullin, 2008). Skilbeck and Connell (2000) define access as *"**the process by which learners may start a programme of education or training where previous knowledge, competence is recognised**".* They highlight the difference between *"**widening participation**"* and *"**increased access**".* Access is key and as a result, allows students from underrepresented groups to attend higher level institutions, such as universities. While this is a good step it does not necessarily mean that the student will complete the degree as retention is a key issue. While an emphasis is placed on the financial and educational supports, inclusion is needed to ensure retention is achieved (Ballantyne et al., 2018).

In recent years there has been an increased demand for a highly skilled and educated workforce, as a result, there was a rise in the number of college applications. The group of students has not been evenly distributed amongst the socioeconomic spectrum, the amount of people from disadvantaged backgrounds is still disproportionate. Patrick Clancy (2001) states that the volume of college places has increased, despite this, only 25% of the relevant population of manual workers progress to higher education. In contrast, 50% of lower professionals attend university and 75% of managers and high professionals attended higher education.

2.3 Providing Accessible Education

There has been a number of elements put in place as an attempt to make higher education more accessible. A number of acts have been put in place over the years including, *The Higher Education Authority Act (1971), The Universities Act (1977), The Education Act (1998)* and *The Report of high-level group on University Equality policies.* University fees were abolished in 1996, this removed some of the financial strain associated with attending university and as a result made attending higher education more attainable.

One of the most notable efforts is the creation of the Higher Education Access Route (HEAR). The HEAR scheme was developed in Ireland as an accessibility initiative. The

HEAR programme is an access scheme which is available in Irish Universities. It offers college places on a reduced points and extra college support to school leavers from socio-economically disadvantaged backgrounds. The HEAR scheme provides extra college supports including an orientation programme, extra tuition, one to one meeting with advisors, social gathering/mentoring and financial assistance ("DARE HEAR Facts and Figures 2017-2018", 2018). The HEAR scheme considers four elements when considering if a student is eligible. A student is considered disadvantaged if no member of their family has attended university before, family income is below a certain threshold, attend a disadvantaged (DEIS) school and they are a member of the six under-represented groups outlined by Patrick Clancy in The Social Background of Higher Education Entrants (2001). People who are considered HEAR eligible are more likely to secure a university place compared with students who are not eligible. Byrne 2013 found that the level of HEAR eligible students attending university on reduced points was on the decline. In 2010, 44% of HEAR applicants had received a reduced points place compared to 33% in 2012. Byrne also found that HEAR students did just as well as direct entry students in the progression beyond first year.

2.4 Underrepresented Socio-Economic Groups in the University Population

High levels of class inequity can be seen in the Irish Education system, there tends to be an overemphasis on academic achievement, which can result to an under participation of certain disadvantaged groups. This can be substantiated from a number of studies completed by Callan and Nolan 1992, Garvan et al 1995, Lynch 1998 and Whelan and Hannan 1998. The connection between socio-economic background and higher-level education can be seen throughout the Irish Education system. Access programmes have existed in Ireland since the early 2000s, with the aim of widening the participation from underrepresented groups in universities, but only began receiving funding since around 2002 (McGuire et al., 2003). The overall rates of people attending universities has increased over the years, from 20% in 1980, to 44% in 1998 and 52% in 2011. Despite this steady increase, only about 26% of semi-skilled and unskilled socio-economic groups attend university compared to almost full participation from higher professional socio-economic groups. The issues of integration and retention are key in the diversification of university students. Retention and integration are issues that particularly affect first generation students. Lehmann carried out research on first generation students attending a Canadian university and discovered that they experienced "***class-cultural discontinuities, such as not fitting in and not being able to relate to other students***".

A number of models have been developed to explain the transition between secondary school and higher educations, one model is the U-curve, developed by Risquez, Moore and Morley. This model breaks the transition into three stages. 1. "The honeymoon", which is the period of excitement, 2. "Cultural shock" which is the period where the student struggled to adapt and finally 3. "Adjustment" is the period where the student gains confidence and feels a greater sense of belonging.

Tinto's influential student integration model is another model which was developed. In this model, the first stage is "separation", in this stage students can feel disconnected from their family and neighbours, this is especially true for individuals from disadvantaged backgrounds or distinct social or ethnic communities. The second stage is the "transition" period, the final stage is when the students have integrated into the university. Tinto notes that for a student to retain in higher education they need to integrate both in the academic and social aspects of

the institution. Fortunately, Access programmes seek to help students with the social aspect of education to ensure retention (Scanlon et al., 2019).

2.5 UCC ACCESS+

UCC ACCESS+ is an initiative from the UCC PLUS office, the initiative was created in November 2019, as a support for students seeking Further Education with the aim of completing higher education. UCC ACCESS+ support is focused on three main phases:

1. Transition of secondary students to Further education (post leaving certificate course).
2. The retention of students in the post leaving certificate course.
3. Progression onwards to higher education.

UCC ACCESS+ is targeted at Leaving Certificate Students who attended a DEIS school, a member of the travelling community or from the Cork Life Centre. It can be seen that the main aim of UCC ACCESS+ is to provide support to students and encourage the pursuit of higher education. UCC ACCESS+ are aware of the under representation of students from disadvantaged backgrounds pursuing further and higher education and have put supports in place as a way of bridging the gap. UCC ACCESS+ aims to provide supports to enable retention from further education students aiming to pursue higher education. They are aware of the issues surrounding students from disadvantaged backgrounds completing a university degree. The programme provides supports to help the student feel included within the university as inclusion is key in the success of pursuing and maintaining higher education. UCC ACCESS+ focuses on school leavers who are going to pursue a post leaving certificate course (PLC), they are aware that retention is key and provide supports to enable the student to attend higher education after completing their further education.

2.6 Conclusion

From the research completed above, it can be seen that there is a clear gap between the amount of people attending higher level education from disadvantaged backgrounds. This inequality has been a part of university culture since the beginning. A number of attempts to bridge the gap have been made from a government level and also at university level. While there are acts and schemes in place they appear to focus mostly on the financial and educational supports. The issues surrounding social inclusion and having a sense of belonging and community within the university remain prevalent. This issue effects the retention rate of students from disadvantaged backgrounds. UCC ACCESS+ are aware of the social element involved and its importance.

Chapter 3

3. Methodology

3.1 Introduction

After conducting research, this methodology chapter will focus on analysing the best approach to tackle the main goal of the project. This chapter will delve into topics exploring aims and objective and identifying gaps and the respective approach to fill them. The following topics include: ACCESS+ online presence, ACCESS+ proposal, project aims and objectives and project methodology.

3.2 ACCESS+ Online Presence

2020 is an especially important time to have a strong digital presence. Due to the Covid-19 pandemic, many physical events and spaces have been cancelled and closed for an unprecedented length of time. Online and digital versions have recently become the new normal, therefore, highlighting the importance of a strong digital presence. Now even more so, we must think hard about providing pupils information with ease.

From researching the ACCESS+ program on the internet, I have realised that UCC ACCESS+ online presence is very limited, with only a webpage, as part of the UCC main website, dedicated as their only form of online platform. Based on my personal observation, while all of the relevant information are available on the webpage, it can be quite difficult to find specific information due to long paragraphs of text, to which I often found myself constantly scrolling up and down to answer a question I had about the program.

Accessing websites on your mobile phone can be difficult at times. Although the UCC website is design compatible with mobile phones, it still has its issues. For example, it is not very user friendly, there is a lot of information on the website, but it is not very well organised. The user has to read through a large amount of information to find what they are looking for. This can be confusing and time consuming for the user. The website is also not interactive, it is very static. There are no dynamic elements to the website. For example, there are no hover states, these elements which change when the user “hovers” their cursor over an element. The website does not interact with the user. The website lacks multimedia elements such as audio, video, or animation; it is a very textual website. The use of animations or videos could be paired with or used in place of the paragraphs of text, allowing for a more digestible form of receiving information.

3.3 ACCESS+ Proposal

Following my initial meeting with the ACCESS+ coordinator, Mr. James Bilson, he proposed the idea of creating a mobile application version of the ACCESS+ webpage. He expressed his concern that there were not many people aware that the ACCESS+ page even exist. We discussed that this was an approach that would allow students to have an easily accessible application on their mobile phones, promoting more involvement and interaction between the UCC ACCESS+ team and the incoming students.

3.4 Project Aims

The aim now is to develop a mobile application with the intent of expanding ACCESS+ online presence, encouraging trust, a wide reach and easy access of information to individuals interested to learn more or to participate in the program.

3.5 Project Objectives

To achieve the aim, I must discover what type of application to create and what software to use. The software chosen should aid in creating a user-friendly mobile application for UCC ACCESS+. It is important that the mobile application is cross platform, allowing students with either an Apple or Android device, to easily download and use the application. Following these objectives, it hoped that it will aid the mobile application development of this project and create a clearer understanding of the requirements to make this mobile application a success.

3.6 Project Methodology

To successfully complete the main aims and objective, methods in which will help me execute relevant tasks, will be considered and implemented. Project methods includes regular meetings with Mr. James Bilson, online research on significant topics and a questionnaire to gain feedback and opinions about the mobile application in question.

Firstly, I had meetings with Mr James Bilson over Microsoft teams, this provided more information about the programme and discussed features and functionalities expected on the mobile application. Second, online research was conducted to form a foundation and deeper understanding of access to university and the university population. Online research was also conducted in order to choose what development platform is the best choice to build the application on. Finally, questionnaires will be used to gather feedback from user testing.

3.7 Subject Matter Expert (SME)

Subject matter experts contain in depth knowledge and expertise in a subject domain. In my case, Mr James Bilson was an SME who I seeked guidance from to gain a greater understanding of the UCC ACCESS+ program. I communicated with him regularly through online meetings via Microsoft teams or via email. This allowed me to ask questions about ACCESS+ and discover more specific requirements that he wanted for the mobile application.

3.8 Online Research

Online research can be classified as both qualitative and quantitative. The research that I completed was qualitative. This research made me realise that there are different types of mobile applications; I found that mobile application could be a hybrid, native, web and progressive web application. There are also a number of different specific development platforms, frameworks and programming languages available to create the chosen type of application. For example, to create a native IOS application, XCode is used as the development platform, in conjunction with the programming language Swift.

3.9 Questionnaires

Questionnaires are an effective method of gathering feedback, allowing for the simple retrieval of data from the user. I intend on implementing the questionnaire in the user testing phase, to gather reaction on the final mobile application. This will allow me to evaluate the effectiveness of the usability and design features implemented on the mobile application.

I decided to make a questionnaire with some standardised sets of responses, and some areas for the participant to type their own answer. I believe this combination will enable for the collection of some quick and solid responses to add to the data, but also some personalised answers. The standardised responses provide reliable and easy to quantify data while the personalised answers provide a more detailed answer.

3.10 Conclusion

In conclusion, planning out and outlining the methodology has allowed me to identify gaps and issues to tackle and prepare for the next stage of the project. Every task that are completed, brings me one step closer to achieving the project end goal, which is to enhance the online presence of ACCESS+ by creating an easily accessible mobile application of the ACCESS+ web page.

Chapter 4

4. Analysis, Design and Considerations

4.1 Introduction

With a mobile application in mind, it is important to consider the aim of the application and factors to consider. The main goal of this project is to produce a functional mobile application for UCC ACCESS+, taking into consideration user friendliness, ease of access of information device compatibility. The mobile application should be easy to use and not require any form of payment or mobile phone credit to operate. As discussed, the requirements of the application include; information sharing, awareness of the range of services available, ease of interaction, ability to link with the existing booking system, the inclusion of animated infographics and real life testimonials of graduates who have successfully followed a HE pathway to FE.

This chapter will also tackle the thought and logical process in choosing the appropriate mobile application type for this project.

4.2 Possible Limitations

There are a number of possible limitations involved in the design and creation of this mobile application. There is the issue of time, I have three months to complete this mobile application, there may be an issue with having adequate time to publish the application on the google play store and apple app store as it is a lengthy process that may require more time than I have available.

It will also take a substantial amount of time for me to research and learn how to create a mobile application. This learning curve may take several weeks out of my already tight time schedule. This issue paired with my current programming skills, which may lead to less time being available to create an impressive application, as much of my time will be spent learning and practising the basics.

Due to the ongoing Covid-19 pandemic, user testing may be an issue. As finding participants will be limited and testing will be solely online.

4.3 Mobile Application Feature Considerations

Accessibility in terms of technology is also very important. The application must be user friendly and accessible in order to be successful in inclusion. Based on research from Ballantyne et al, a number of elements must be considered and implemented to ensure a mobile application is accessible. These features include having control of the audio and video and having the ability to use alternatives for example captions or subtitles. Images in the user interface (UI) must be clearly labelled in the code to enable a screen reader to operate correctly. The text must be an adequate size, colour and format, the ability to change these factors is also important and text to speech. Giving the user some control is key, for example, light/dark modes and the orientation of the screen. It is also important that the user has enough time to interact with the content. Minimising the data entry improves flexibility and efficiency, the application should remember previous data entered. Offering radio buttons or check buttons also increase efficiency over typing in every answer. A predictable operation reduces the chance of error, providing explanations and resolutions for errors will also

improve the user experience. Finally, gestures can be used, gestures are alternatives which are replaced for example touch targets close to minimum size are surrounded by inactive space this prevents a user with poor sight from pressing the wrong thing. In order to ensure an application is accessible the above points need to be considered and implemented (Ballantyne et al, 2018).

4.4 Choosing Mobile Application Type

As mentioned previously, there are a number of different options available for the type of application and their respective development platform. These options include native, hybrid and web applications. The appropriate mobile application type for the project, depends on the purpose of the application and the required features and functionalities within the application. From meetings with Mr. James Bilson, it was stated that the application's main purpose is to allow easy access of information about the program and encourage more interaction between the ACCESSS+ team and students who are already in the program or who wishes to avail of it.

Native mobile applications are built specifically for one platform for example android. Hybrid applications are built using web technologies like HTML, CSS and JavaScript and are cross platform. Web applications are application software which run on the web server, web applications can be accessed by the user through the web browser. In order to create the mobile application, a big decision must be made to decide which platform is appropriate to use to create the app. Each platform has its advantages and disadvantages, this chapter will be focused on researching and comparing the platforms in order to choose the best fit for the project.

4.4.1 Native Applications

Native applications are device, platform and programming language specific. For example, creating a native application for IOS devices will require the use of a specific development platform or integrated development environment (IDE), like XCode, with Swift/Objective-C as the respective programming language. On the other hand, Android application uses Android studios as the IDE platform with Java as the programming language. These applications are then deployed to their respective app store, Google Play Store (Android) and Apple App Store (IOS), where users can download it from. Downloading will result into the application being install into the device, appearing as an icon for easy access.

Native apps take advantage and use the full features of the device specifications, as it is made specifically for that device. They require full access to all the hardware and functionality of the device in order to work. Standardised SDKs (Software development kits) are provided, which contain code samples, tools, documentation, libraries, and guides. SDKs are paired with tools to create high performance and good user experience. Below are a number of advantages and disadvantages associated with native applications.

Advantages

Native apps work faster than hybrid or web apps, as they are native to the device. It works with built in features and many elements are pre-loaded and as a result, the app works offline. The app is recognisable to the device which makes them easy to learn and use. This enables the user to quickly understand the natural flow of the app. They also maintain aspect ratios good orientation, size, and resolution. For example, Android has constraint layout and iOS has auto layout.

Disadvantages

Native apps must be downloaded from the app store or google play store, and this contains a number of steps; 1. Finding the app, 2. Accepting terms and conditions and 3. Downloading. There is no flexibility as the app must be developed for a particular device. This means that an application must be developed separately for IOS and Android devices. This is costly, time consuming and requires separate team with specialised knowledge on both platforms. Not to mention, native apps also require frequent upgrades and maintenance.

4.4.2 Hybrid Application

Hybrid applications are a mixture of native and web solutions. These types of apps are cross platform, which allows for the development of applications for different devices using a single code base. This means that the actual application is built using web technologies, such as, HTML, CSS, and JavaScript, which are then deployed in a native container, allowing access to the native device's features and functionalities through the use of plugins. There are a number of advantages and disadvantages associated with this approach.

Advantages

Hybrid applications have lower development costs compared to native applications. They are roughly 30% cheaper to develop as hybrid applications can use the same code base for multi-platform development. It is faster to develop as there is no need to write unique code for each platform. It also makes it possible to reuse big chunks of code between the platforms. There is a greater reach with hybrid applications, as it is available to downloaded easily on all mobile devices.

Disadvantages

Compared to native applications they perform slower; the difference is usually very slight if it is a simple application. There are also functionality limitations in terms of complex features, hybrid frameworks such as PhoneGap, do not support every native feature.

4.4.3 Web Application

Web applications are a software or program which is accessible using any web browser. Unlike native and hybrid applications, web apps exist outside of app stores, as it is not stored locally on a device's operating system. This also means that the web app does not have access to specific device features like GPS, Bluetooth connection etc.

Progressive web apps (PWA) were then developed by Google, which allows for device feature adaptation to be implemented into web apps, such as push notifications and icons, allowing for the mimicry of a native application. There are a number of advantages and disadvantages associated with the web app and PWA approach.

Advantages

Web applications have good user experience and responsive design. As they are accessed via the web browser, they are also cross platform and scale to the device being used. A web application has infinite storage as it is based on the cloud. The web app being updated is not an issue, as the up to date version will be displayed by everyone who is using the same version of the web application via the URL.

Disadvantages

Web apps are reliant on an internet connection, if the user is not connected to the internet, they will not have access to the web app. There is reduced speed as the web app will operate slower than the one hosted on the server locally. Not all browsers support web apps, one needs to ensure the web app is supported on a variety of browsers as people use different browsers. There are also limited functionalities as the web app will only have access to the user's browser capabilities and not the device features.

4.5 Final Choice

Initially I had planned on doing a native Android application using java in android studios, but after talking with James Bilson the coordinator of UCC ACCESS, one of the main requirements was for the application to be cross-platform, as it is important that everyone has access to the app. I quickly realised that it is not advisable to make a native application due to the cross-platform demand. In this case, I would need to create two applications, one for iOS and one for Android, which is not feasible for many different reasons. This would be a time-consuming process and quite frankly an unrealistic goal for the given timeframe, as I would need to learn multiple programming languages and develop the same app on different platforms.

I then chose to do a web application as it promotes device compatibility and I had prior experience using HTML, CSS, and JavaScript. Converting the UCC ACCESS+ website into a progressive web app, seemed like a solution, but after speaking with members from the UCC IT Services Department I realised it was not an option as the website has inter-dependencies with the UCC website.

After all that, a hybrid application seems like the most viable option for the ACCESS+ mobile application. The programming languages used to build apps are within my skill range, significantly reducing time of learning. It can be deployed to both Android and iOS devices and access device features as needed, which fulfils the main requirement of the expansion of the ACCESS+ webpage, by allowing further reach with cross-platform applications. I have concretely decided to create hybrid application as I believe it is the best option for the project

4.6 Conclusion

It is important to determine factors to considers, capabilities, limitations and what type of application is needed to attain the project's end goal. By conducting research, I was able to pinpoint that a hybrid application was the appropriate choice for this project. Accessibility is a key focus of UCC ACCESS+, it was important to ensure the application was accessible to as many people as possible. A hybrid application ensures cross-platform functionalities.

Chapter 5

5. Choosing Development Framework

5.1 Introduction

This chapter will focus on choosing which framework, platform and programming language to use to create the hybrid mobile application. There are a number of different platforms and languages I can choose from to create this hybrid app, including Ionic, Flutter and PhoneGap. This research will allow me to assess the advantages and disadvantages of each platform. I will choose the one that best suits my programming skills, the time frame and the requirements of the app.

5.2 Ionic

The Ionic framework enables the creation of cross platform-applications using a single code base. It's completely open source and it allows for the creation of cross platform apps using web developer tools and technologies like HTML, CSS and JavaScript. The ionic framework can be used in conjunction with UI libraries such Angular, React, JavaScript and Vue. Ionic application are initially built as a web application, but with the use of Cordova or Capacitor, Ionic is able to wrap the web application, allowing full native access on devices with different operating systems. This enables the ability to use and access any native functionality of a device, just like a native application. This allows the application to be used across a range of platforms including iOS, Android, Windows and as a web app or PWA. This then would deem Ionic applications to hybrid, due to its cross platform abilities.

Advantages

Advantages associated with using the Ionic framework. Ionic is a good framework to use if the project is being completed by one person for multiple devices, as it only requires one code base. Ionic uses HTML, CSS and JavaScript and can further UI libraries such as React and Angular. I have experience using HTML and CSS, as a result there should not be too much of a learning curve involved as I am familiar with the basics already. Ionic has an extensive library and plugins, which allow the app to function like a native app. It also contains a development kit which has UI components and app icons. Ionic also provides a vast amount components documentation and support.

Disadvantages

There are not many disadvantages associated with the Ionic framework. Apps made using the Ionic framework are slightly slower compared to native applications, the difference is not something that is very noticeable. Apps made using the Ionic framework are not good at 3D graphics or video games. These are not very serious disadvantages in consideration of my app and its requirements.

5.3 Flutter

The Flutter framework is open source, it has been acquired by Google and is a relatively new framework, first developed as a start-up in 2013 by YC. Flutter uses the programming languages C, C++, and DART. The flutter framework can create cross platform applications.

Although it is a new, it has been used to create some well-known applications including Reflectly, Google Ads, Birch Finance and Alibaba.

Advantages

The Flutter framework is similar to react native. It has specific widgets which make the app look and feel more native to the user, this in turn makes the app user friendly. The UI is flexible which also allows for a user-friendly interface. There are many features which make building apps using flutter a good experience. It has access to native features due to its use of third-party integration and platform APIs. The dart programming language requires minimal code to create a functioning app. Flutter also has hot reload which means that any changes are updated immediately, this allows for quick testing and bug fixes. The framework is relatively easy to use due to its design, the user first designs the UI in the flutter app builder, the app is then developed after using Dart.

Disadvantages

Although Flutter has many advantages, there are a number of disadvantages. Due to the fact that it is a new framework there is not many scripts available, it also has a limited library and many features are missing. The apps created using flutter are not yet supported by the web browser, this limits the app as it must be downloaded from the app store or play store to function.

5.4 PhoneGap

PhoneGap also known as Apache Cordova is a cross platform, open source framework. It uses HTML, CSS, and JavaScript as its programming languages. Assets run in a WebView within the native app container on the platform e.g. iOS. This web app within the native app then accesses the devices API using JavaScript.

Advantages

PhoneGap applications are compatible with all platforms, it also removes the differences between the look and feel of different platforms. Because it uses HTML, CSS, and JavaScript this makes it easy to develop as I am familiar with these web technologies. PhoneGap allows access to the hardware of the device for example the camera, location, and accelerometer this causes the application to appear more native to the device. There are also a large number of PhoneGap/Cordova plugins and documentation available.

Disadvantages

While PhoneGap has advantages it also has a number of disadvantages. It does not support all functionalities as it does not support all plugins. Applications made using PhoneGap perform slower compared to native apps. PhoneGap only allows the developer to develop an app once then there is a subsequent fee thereafter.

5.5 Final Choice

I decided to develop the application using the Ionic framework with the React library and Capacitor. I made this decision as Ionic provides reusable web component library with highly

customisable and professional looking components. I chose to implement the frontend framework React with Ionic to handle the look, feel and scalability of the UI components. The default UI is very easy to edit and customise. Lastly, I chose to integrate the Capacitor to my project, as the main aim is to be able to install the application on different devices and their respective operating system.

React is a frontend JavaScript library that use the JSX syntax, which is very similar to HTML. As I am familiar with HTML and CSS, JavaScript, there should not be a very steep learning curve. Ionic is best suited for simple applications as it does not perform well with 3D animations or video games. I intend on creating a simple application, therefore I believe Ionic is the best contender. Ionic has a very strong community and support providing sample code and solutions. Due to its large following, around 98% of Ionic code can be reused leading to minimal coding being required, which is helpful in my case, give the time constraint.

Chapter 6

6. Design

6.1 Introduction

Design is a key part to mobile applications. The number of people using apps is increasing, people are turning to using their phones instead of laptops. This can be seen as in 2018 the number of mobile apps downloaded was 205.4 billion and it is expected to increase to 258.2 billion by 2022 ("Annual number of mobile app downloads worldwide 2019 | Statista", 2020). User interface (UI) and user experience (UX) is key to a successful and well-functioning app. The UI enhances the user experience and it is a huge element within app use. The UI is the way in which the user interacts with the application, this includes buttons, controls, blocks, and elements. The UX is the ease of use the user experiences with the application. The interface must be pleasing to the eye but also interest the user. Due sear number of apps available there is a strong competition for apps to be downloaded and used, the design of the app plays a huge role in whether or not the user decides to continue using the app. This chapter will focus on the design and interface of my application, the factors I considered, draft designs and the final design.

6.2 Factors to Consider when Designing an Application

There are many design factors which effect the overall usability of an application. It is important to not give the user too much information at once as it will reduce the cognitive load placed on the user. The design should be consistent and simple. The visual, functional, and external elements should be kept consistent. This allows the user to navigate the application quickly due to the standardised nature of the design. Keeping the design simple also avoids complicating the user experience and confusing the user. It is important to declutter the application, keep the interface minimalistic and only show the user what they need to see. Progressive disclosure can be used to keep the interface simple and clean, when something is clicked it will open up a pop up window which provides further information to the user, this avoids cluttering the interface but also provides the user with the relevant information. This is key to design as it provides the user with a clean interface while still displaying the necessary information. Using smart technologies can also improve the design of the application, autocomplete prevents the user from filling in the same information multiple times, having the keyboard set to the appropriate one is also convenient for example if the user is inputting a phone number the numeric keyboard should appear. Visual weights can also be used to place emphasis on a certain area of the text. Google and iOS have guidelines in place to help with the design of user interfaces.

6.2.1 iOS Design Themes

1. Clarity, ensuring that text is legible, and icons are clear, this can be achieved using negative space, colour, fonts, graphics, and interface elements to highlight and make content clear.
2. Deference ensure the content is fluid motion and crisp. Minimal use of bezels and gradients create a light and airy interface.
3. Depth, visual layers, motions and transitions create a sense of depth.

6.2.2 iOS Design Principles

1. Aesthetic Integrity, how well an apps appearance and behaviour integrate with its functionality for example a game should be immersive with high quality graphics.
2. Consistency, standardisation is important to familiarise the user which in turn makes it easy to use the application.
3. Direct Manipulation, the content interacts and engages with the user for example gestures and rotation.
4. Feedback acknowledges the actions of the user and shows results.
5. Metaphors, the applications virtual objects and actions are metaphors for familiar experiences which makes it easier to learn and understand for example turning the pages of a book or dropping something into the recycling bin.
6. User Control, finding a good balance between the user and application control.

6.2.3 Design Systems by Google

1. Principles
   1.1 Material is a metaphor, this is inspired by the physical world and its textures, giving virtual elements a more physical feel.
   1.2 Bold graphics create a hierarchy, this gives meaning and focus, this is achieved using typography, grids, colour, and imagery.
   1.3 Motion provides meaning, as the subtle feedback improves the users experience by providing a response.
2. Components
   2.1 Interactive building blocks are used to create a UI, the components are made up of display, navigation, actions, input, and communication.
3. Theming
   3.1 Colour, the colour system is an organised approach to UI, it focuses on complementary colours to create a vision or colour scheme.
   3.2 Typography is used to place weight on certain elements of the text, there are thirteen styles.
   3.3 Shape, is used to help direct attention, shapes are grouped based on size for example small, large etc.

6.3 Initial Draft Design

My initial design consists of an opening screen, home screen, photos screen, about, booking, events, videos, and maps. I wanted to keep the design clean and concise to ensure the application was easy to navigate.

Opening Screen

The opening screen consist of a sign in field in the centre of the screen. There was also going to be an option for light or dark mode in the top right corner. The top left corner would have the UCC ACCESS+ logo and the bottom of the screen would have a image. The main function of this screen is for the user to sign in this is why I placed this in the centre.

Home Screen

The home screen was meant to consist of the UCC ACCESS+ logo in the top left corner, I intended on keeping the location of the UCC ACCESS+ logo consistent. Large circle in the middle is labelled “Menu”, when clicked smaller circles appear surrounding the large “Menu” circle. These are Labelled “About”, “Events”, “Booking”, “Video testimonials” and “Maps”. Clicking on these smaller circles brings you to the corresponding page.

There is a dropdown menu on the top right-hand corner options include home, contact, events, booking, video testimonials, maps, and profile. The large box in the middle of the screen contains info about UCC ACCESS+. There is a back button a light and dark mode option. There is a Popup box in the right side of the screen promoting events, showing past events, important information etc.

Booking Screen

In the top right of the screen there is a dropdown menu the same as the “About” screen. The booking section is in the middle of the screen, it is made up of a label, calendar, and details box. Similar to the other screens there is a light and dark mode option in the bottom right and a back button on the bottom left.

Events Screen

Contains a dropdown menu in the top right corner, like the other screens. A calendar is located in the middle of the screen to the left. There is a image of a previous event at the bottom of the screen and a popup box to the right of the screen. There is also a back button and light and dark mode option the same as in other screens.

Video Screen

There is a dropdown menu, back button and light and dark mode options the same as the previous screens. In the middle of the screen there is a video which will autoplay. Along the bottom of the screen there is a selection of video testimonials.

Maps Screen

Dropdown menu, back button, light, and dark mode the same as previous screens. The map will take up the rest of the screen. Under the search bar, there will be a popup option which suggests UCC buildings.

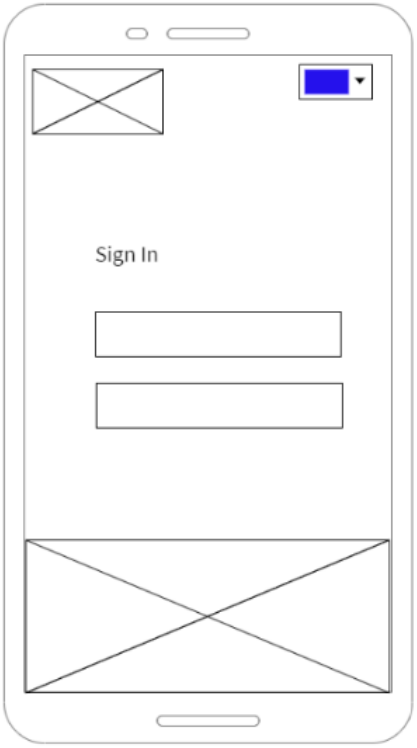


Figure 2: Sign in Screen

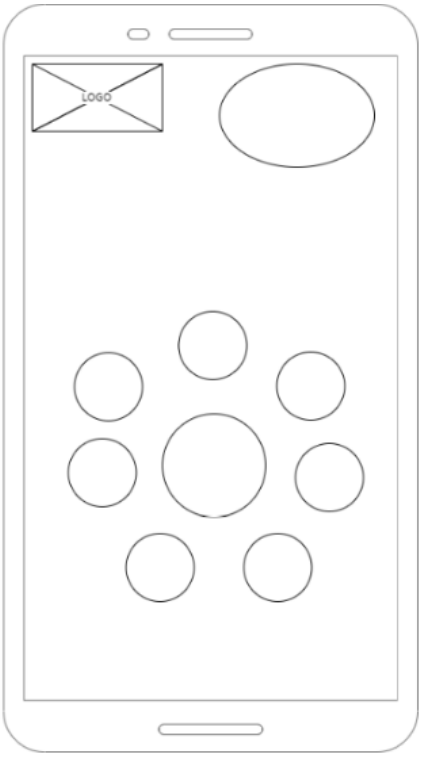


Figure 1: Home Screen

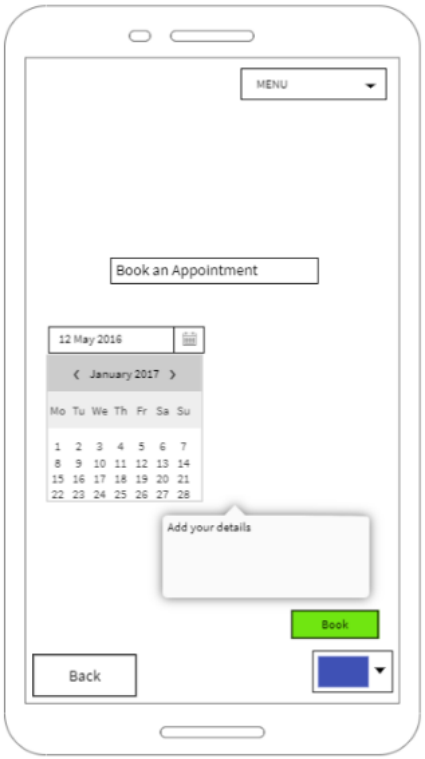


Figure 4: Booking Screen

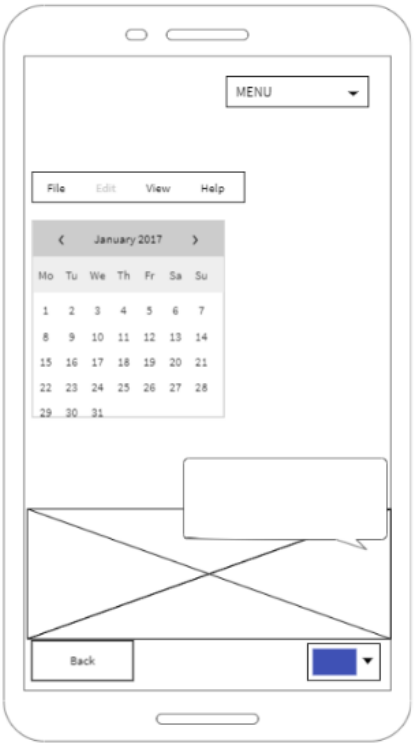


Figure 5: Events Screen

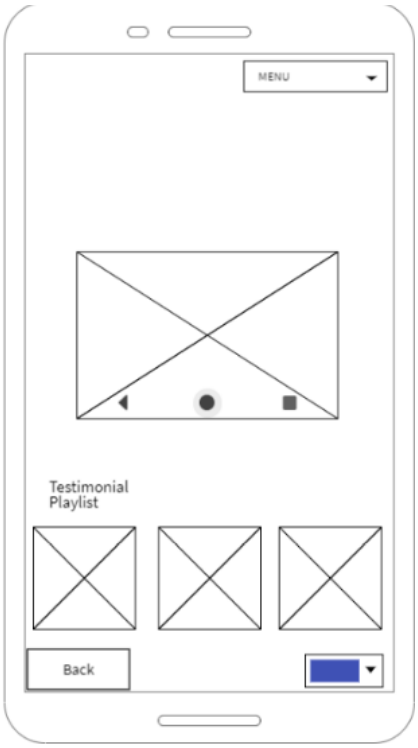


Figure 6: Video Screen

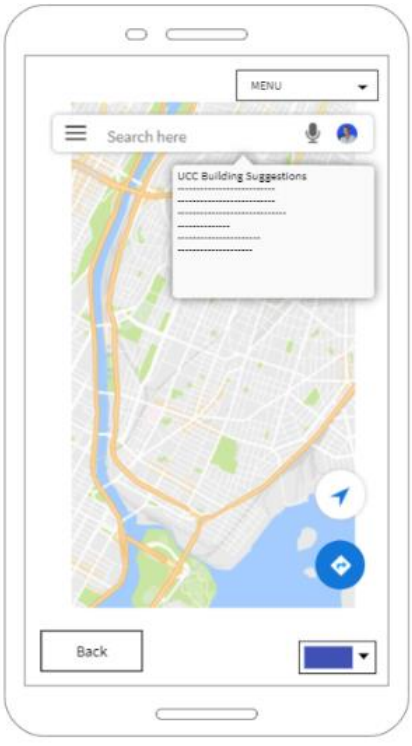


Figure 7: Maps Screen

.

6.4 Final Design

After doing more research and beginning to develop the mobile application I changed the design to a more aesthetically pleasing and user-friendly design. I made a cleaner design to avoid confusion. I kept a standard design throughout each section to ensure that the application flowed well and was cohesive. The initial design appears cluttered which in turn causes it to be complicated, after researching interface design in more depth I decided to change the design. The final design is simple, but easy to navigate. I did research by looking at popular applications on the app store and studying their design, I then implemented design aspects that I found effective, this included the box design as it is simple and easy to read the information. I believe the final application design has a modern look and feel to it with large areas of whitespace to allow the user to focus on the information and not on a complex background. The simplicity of the application design makes the user experience more enjoyable, if too much information is displayed on a screen the user may feel overwhelmed and not use the application. As the app is mainly being used as a point of information it is important that the information is easy to find and understand for the user. The colours I chose were from UCCs website colour palette, this helps the application and website to fit together nicely as there is an aesthetic connection between the two.

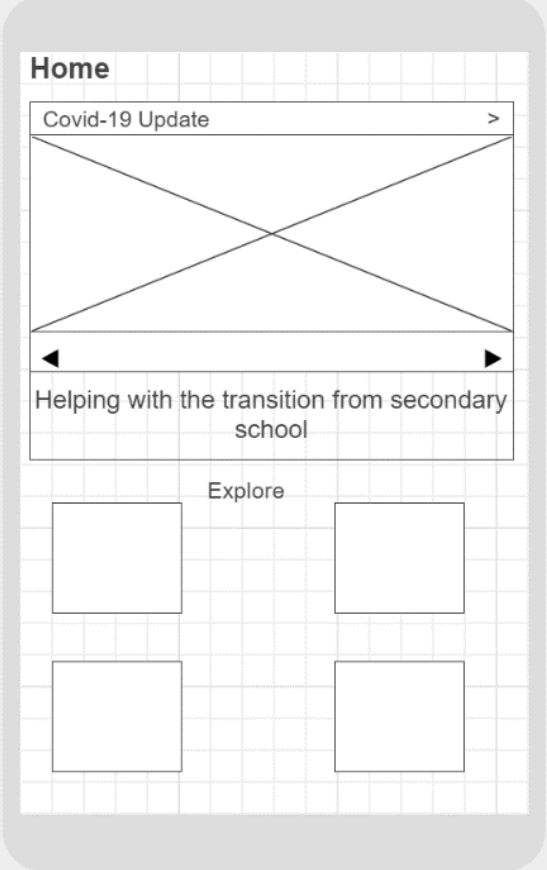


Figure 8: Home Page

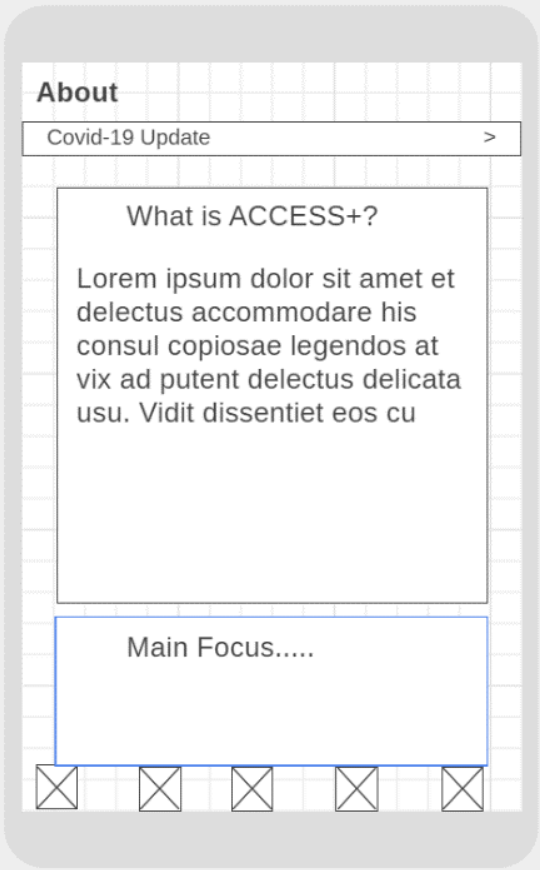


Figure 9: About Page

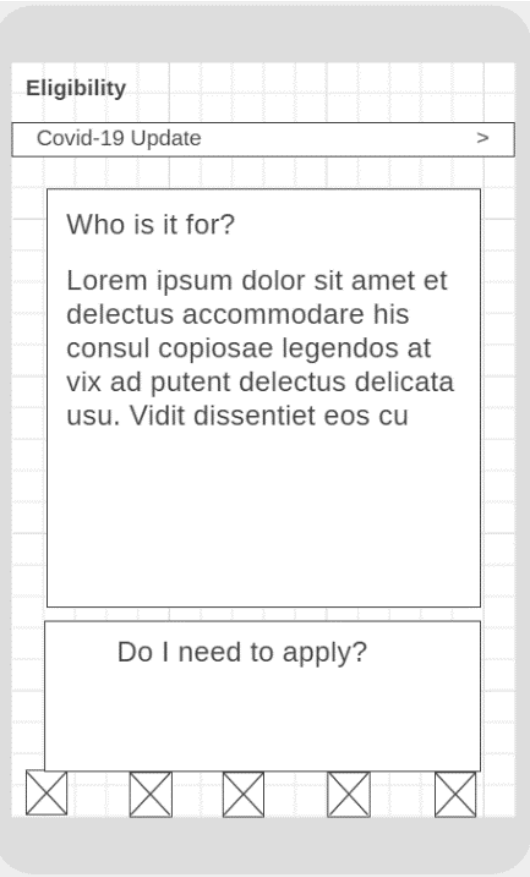


Figure 10: Eligibility Page

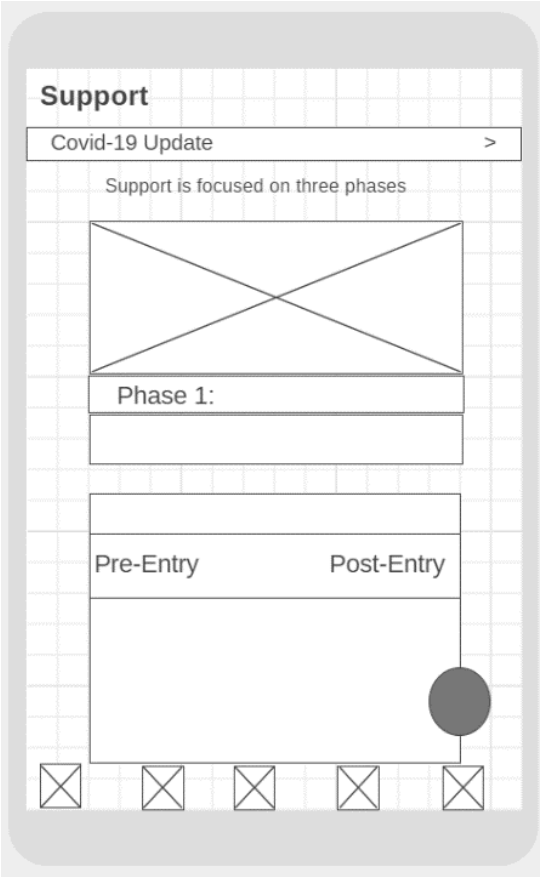


Figure 11: Support Page

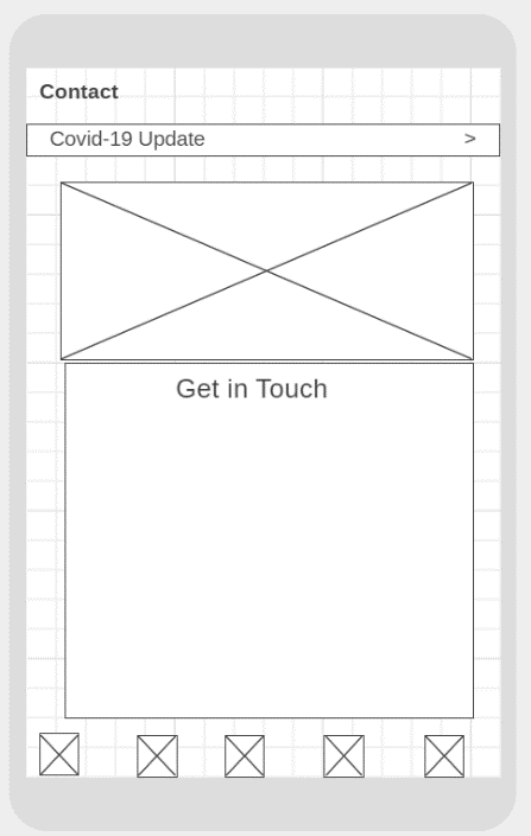


Figure 12: Contact Page

Chapter 7

7. Creating the ACCESS+ Animation

7.1 Introduction

To create the animation, I used the software Animaker. I chose Animaker as I found it to be very user friendly. Animaker is a web-based program which is easy to navigate, it has relatively simple tools to use as many are drag and drop and the interface is very visual. It also has a library of templates for backgrounds, characters and objects which makes creating a scene quick and effective.

7.2 Pre-Production

I was given scripts by the UCC ACCESS+ team, I asked two drama students do perform the scripts and I recorded them. Once I had the recording, I used a mp3 snipping tool called mp3cut.net, I divided up the individual responses to make it easier to insert into the animation later. I then made a rough storyboard using Canva, to have a better idea of how the animation would flow.

7.3 Production

Using Animaker I set up the first scene, selecting background images and properties. I added animated text to the first scene and background music. For the next scene I customised two characters and added them to the scene introducing them using arrows with text. I created each individual scene including outside the college, inside the classroom and inside the study. I then animated the characters, Animaker has premade expressions and animated poses to choose from. I then added the sound clips, the sound in turn leads to the character automatically lip synching with the audio. I adjusted the audio clips and the scene lengths to ensure the animation ran smoothly. Lastly, I downloaded the mp4 file of the animation.

7.4 Post-Production

After the animation was complete and downloaded, I decided to add subtitles. I wanted to ensure that everyone who watched the animation could easily understand what was being said. To add the subtitles, I used a website called Kapwing, I typed out each sentence and added it where the character was saying that particular line. I believe this addition added to the accessibility of the animation as a learning tool on the app.

Chapter 8

8. Development and Implementation

8.1 Introduction

After careful research on design considerations, the next step is the development process. This entails the building and creation of the ACCESS+ application using the Ionic framework with React.

8.2 Set Up and Installations:

Before beginning any development process, the first step up is to set up or install any tools, components and environments that are required to assemble and create the product, in this case, a hybrid mobile application.

8.2.1 Node & NPM Environment

In order to get started with the Ionic framework, Node.js and npm must be downloaded. This can be done by downloading the latest LTS version on nodejs.org to ensure compatibility. The download can be verified by typing "***node -v***" or "***npm -v***" on Terminal (Mac) / Command Prompt (Windows), to check which version is currently installed.

8.2.2 Ionic Command Line Interface (CLI)

The creation of Ionic apps are primarily done through the Ionic CLI, deeming it essential for developing an Ionic cross-platform application. With Node and npm all set up, the CLI can be installed through the Terminal or Command Prompt by typing "***npm install -g @ionic/cli***". Verify the installation by typing "***ionic –version***".

8.2.3 Capacitor

The Capacitor is a tool that works well with Ionic to convert any Ionic app into a cross-platform mobile app, which can serve as a native app on IOS, Android, Desktop devices. The Capacitor can be thought of as a wrapper that wraps around an Ionic application, which allows for creating real native apps that can be built and uploaded to a platform's respective App Store e.g. Apple App Store (IOS).

- **Capacitor and IOS**
  - A native IOS platform can be added to an existing project by typing "***ionic capacitor add ios***".

  - Additionally, a dependency manager for Swift called CocoaPods must be installed, this allows for easy management of external libraries. This can be installed by typing "***sudo gem install cocoapods***".

- **Capacitor and Android**
  - A native Android platform can be added to an existing project by typing "***ionic capacitor add android***".

8.2.4 Code Editor: Visual Studio Code

Visual Studio Code is an open source code editor that allows for editing projects in many different programming languages. It can be downloaded at code.visualstudio.com

8.3 Starting a New Project

To create a new blank project, open Terminal or Command Prompt and type "***ionic start uccApp blank --type=react --capacitor***"

→ uccApp: project name
→ blank: blank template
→ --type=react: start a React project
→ --capacitor: integrate capacitor for native functionalities

8.3.1 Previewing Project

The newly created project can be viewed in different ways: locally in a web browser, deployed to an IOS device or deployed to an Android device. In this case, I decided to run the project locally on a web browser until it is ready to be deployed onto a device.

To preview, navigate to the location of the project by typing "***cd uccApp***" and once located, type "***ionic serve***". This starts and run a development server through which I can view the application locally at localhost:8100, on a chrome browser window.

8.3.2 Mobile View

To view the application on different mobile devices, simply right click on the page and click "Inspect" and choose the desired device you wish to view the application on.

8.3.3 Viewing and Editing Source Code

In order to start editing and writing code, Visual Studio Code can be used to open the initial project folder that was created after starting a new project. This can be done by opening VS Code and clicking, File → Open Folder, locate the project folder and open it.

8.4 Content, Pages and Layout

8.4.1 Content

With all the information I've collected through research, I analysed all the information surrounding the ACCESS+ program and determined how to break down and display the information appropriately on the app to prevent information overload. I was able to break down all the information into five clear categories: Home, About, Eligibility, Support and Contact. I decided that these categories will be the navigation bar, in order to instantly highlight specific information about ACCESS+.

8.4.2 Pages and Layout

I proceeded to create five pages, each with their respective CSS files, for design and customisation purposes. These pages are titled as follows, “Home”, “About”, “Eligibility”, “Support” and “Contact” and saved as “.tsx” file extension. This file extension allows for the embedding of JSX elements, which is used in conjunction with React to communicate how a component should look and act like. Dependencies must be imported to allow this, and it can be done by calling “***import React from ‘react’;***” at the beginning of every page.

Now that that has been setup, the pages can be filled with components containing information, to be laid and displayed in a neat, clear, and consistent manner.

8.5 Components

This section will focus on showing the different UI components and how they were implemented to create the ACCESS+ mobile application. From the Ionic documentation, the UI Components are described as “high-level building blocks”, ("UI Components - Ionic Documentation", 2020), which are used to construct the user interface of the mobile application. Below are the main components that I used to build the mobile application with.

8.5.1 Navigation Bar: Ion Tabs

The navigation bar allows the user to navigate through the different pages within the mobile application.

Figure 13: Navigation Bar

The “Ion Tabs” component is used for routing navigation within the application. It also includes “IonTab”, “IonTabBar” and “IonTabButton” sub components to allow the implementation of UI feedback and design using CSS.

```
<IonTabs>
  <IonRouterOutlet>
    {/* Navigation Tabs Routes */}
    <Route path="/home" component={Home} exact={true} />
    <Route path="/about" component={About} exact={true} />
    <Route path="/eligibility" component={Eligibility} exact={true} />
    <Route path="/support" component={Support} exact={true} />
    <Route path="/contact" component={Contact} exact={true} />§
    <Route path="/" render={() => <Redirect to="/home" />} exact={true} />
  </IonRouterOutlet>
```

Figure 14: Navigation Bar [Routes]

```
<IonTabBar slot="bottom">
  {/*----- Tab 1 | Home ------ */}
  <IonTabButton tab="tab1" href="/home" class="ion-activatable ripple-parent" className="tabs-button-home">
    <IonIcon icon={homeOutline} />
    <IonLabel>Home</IonLabel>
    <IonRippleEffect type="unbounded"></IonRippleEffect>
  </IonTabButton>
```

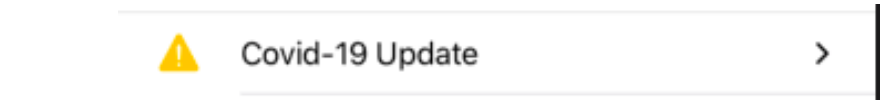
Figure 15: Navigation Bar [TabBar & TabButton]

```
/* Tabs Design */

.tabs-button-home{
  --color-selected: rgb(116, 170, 80);
}

.tabs-button-about {
  --color-selected: rgb(105, 179, 231);
}

.tabs-button-eligibility {
  --color-selected: rgb(117, 102, 220);
}

.tabs-button-support {
  --color-selected: rgb(198, 137, 63);
}

.tabs-button-contact {
  --color-selected: rgb(255, 170, 190);
}
```

Figure 16: Navigation Bar [CSS]

8.5.2 Covid-19 Update: Ion Modal

This component shows the latest update on the global pandemic crisis and actions being taken by UCC.




```
{/* -- Covid 19 Update (List)-- */}
<IonList>
  <IonItem onClick={() => showCovidUpdate(true)} class="ion-activatable ripple-parent">
    <IonIcon icon={warning} color="warning" slot="start" />
    <IonIcon icon={chevronForward} slot="end" size="small"/>
    <IonLabel > Covid-19 Update</IonLabel>
    <IonRippleEffect type="unbounded"></IonRippleEffect>
  </IonItem>
</IonList>
```

```
{/* Show Covid 19 Update (Modal) */}
<IonModal isOpen={covidUpdate} cssClass='my-custom-class'>
  <IonContent fullscreen>
    <IonToolbar>
      <IonTitle></IonTitle>
    </IonToolbar>

    <IonItemDivider color="warning">
      <IonTitle>Covid-19</IonTitle>
      <IonButtons slot="end">
        <IonButton onClick={() => showCovidUpdate(false)}>Close</IonButton>
      </IonButtons>
    </IonItemDivider>
```

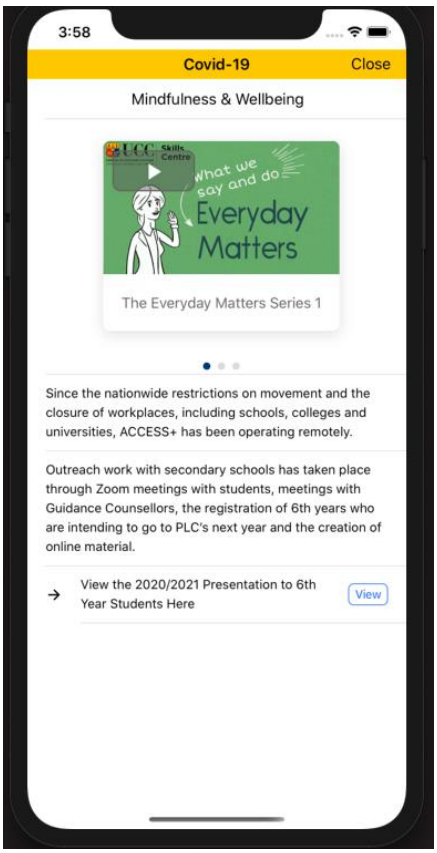


Figure 17: Covid-19 Update [Modal]

8.5.3 Floating Button: Ion Fab

This floating action button enables for quick access to booking one to one appointments as a student or register to the program.

```
{/*-- Floating Fab [bottom right] --*/}
<IonFab vertical="bottom" horizontal="end" slot="fixed">
  <IonFabButton>
    <IonIcon icon={person} />
  </IonFabButton>
  <IonFabList side="top">
    <IonFabButton href="http://bit.ly/312yze2Booking" ><IonIcon icon={book} /></IonFabButton>
    <IonFabButton href="http://bit.ly/registerUCCaccess"><IonIcon icon={clipboard} /></IonFabButton>
  </IonFabList>
</IonFab>
```

Figure 18: Floating Action Button [Fab]

8.5.4 Information Boxes: Ion Card

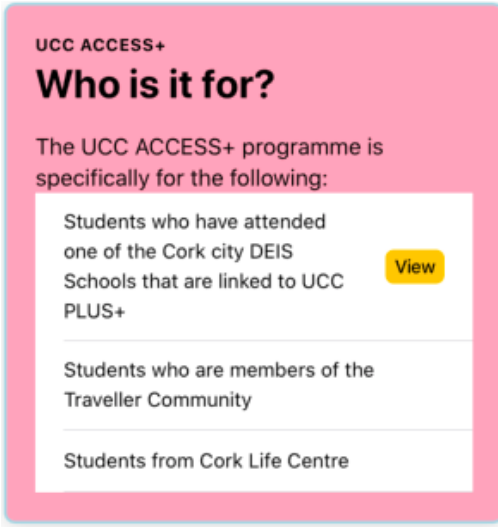
These cards contains information or multimedia (e.g. video or image), allowing information to be neatly portrayed.

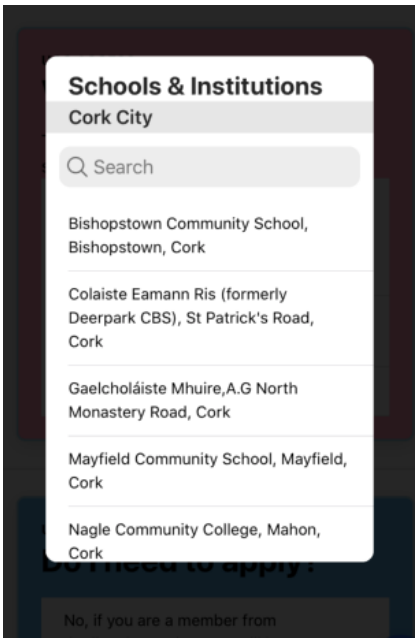

```
{/* -- Original Animation (Card) -- */}
<IonCard class="home-video-card">
  {/* -- Video Player [video-react] -- */}
  <Player
    playsInline
    poster="./assets/icon/AccessLogo.jpg"
    src="./assets/videos/access_animation.mp4"
  />

  <IonCardContent>
    Supporting transition from Further Education to Higher Education.
  </IonCardContent>
</IonCard>
```

Figure 19: Information Cards [Card]

8.5.5 Presenting Box: Ion Popover

Popovers are a box of text or information that presents itself when an action or an event has taken place; for instance, clicking a button.





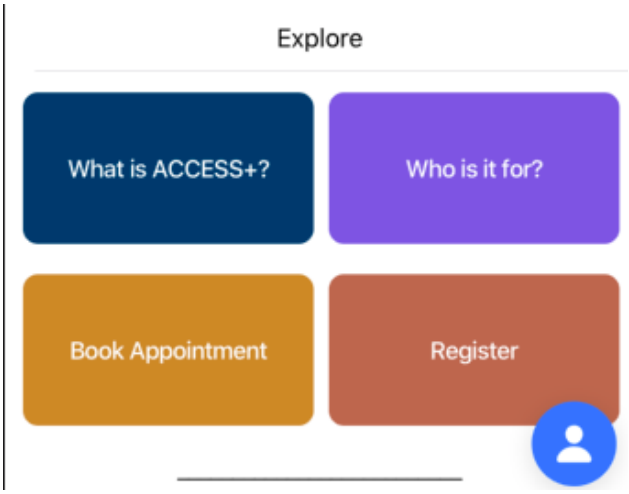

```
<IonButton size="small" fill="solid" slot="end" color="warning" onClick={() => showParticipatingSchools(true)}>View</IonButton>
```

```
{/*-- Show participating schools (Popover) --*/}
<IonPopover
  isOpen={participatingSchools}
  cssClass='eligibility-show-schools'
  onDidDismiss={e => showParticipatingSchools(false)}
>
  <IonList>
    <IonListHeader class="ion-text-wrap">Schools & Institutions</IonListHeader>
    <IonItemGroup>
      <IonItemDivider>
        <IonLabel>Cork City</IonLabel>
      </IonItemDivider>
      <IonSearchbar value={searchText} onIonChange={e => setSearchText(e.detail.value!)}></IonSearchbar>
      <IonItem>
        <IonLabel class="ion-text-wrap">Bishopstown Community School, Bishopstown, Cork</IonLabel>
      </IonItem>
```

Figure 20: Presenting Box [Popover]

8.5.6 Clickable Boxes: Ion Button

Buttons exists everywhere in the app, encouraging users to interact with the mobile environment. The buttons are clickable components that returns an action when clicked.

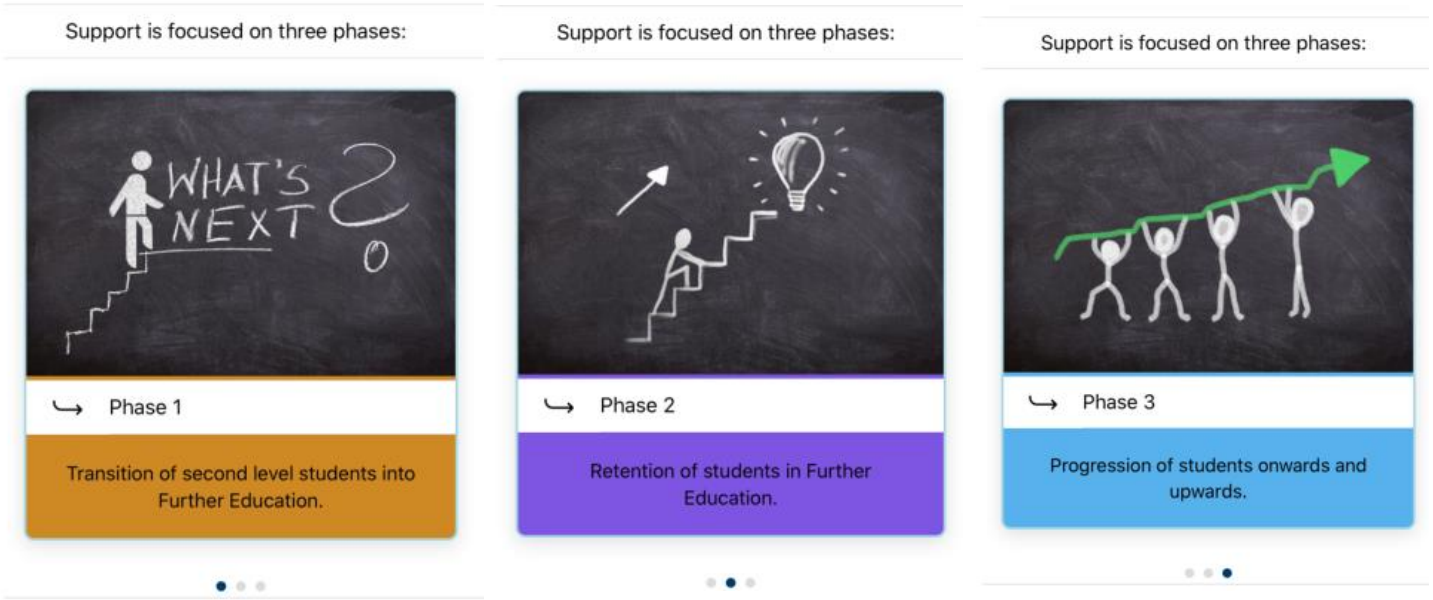



```
{/* -- Navigation (Buttons) -- */}
<IonGrid>
  <IonRow class="home-row">
    <IonCol class="home-col">
      <IonButton class="col-button-1" href="./about">What is ACCESS+?</IonButton>
    </IonCol>

    <IonCol>
      <IonButton class="col-button-2" href="./eligibility">Who is it for?</IonButton>
    </IonCol>
  </IonRow>
</IonGrid>

<IonGrid>
  <IonRow class="home-row">
      <IonCol class="home-col">
        <IonButton class="col-button-3" href="http://bit.ly/312yze2Booking">Book Appointment</IonButton>
      </IonCol>

      <IonCol>
      <IonButton class="col-button-4"  href="http://bit.ly/registerUCCaccess"> Register</IonButton>
      </IonCol>
  </IonRow>
</IonGrid>
```

Figure 21: Clickable Boxes [Button]

8.5.7 Information Slides: Ion Slides

There are numerous information slides in the ACCESS+ application. They mostly contain other components within the slide e.g. Card, Button. The addition of slides I feel, adds a modern touch to the application, positively increasing the user experience.




```
{/* -- Three Phases (Slides) -- */}
<IonItem>
  <IonSlides pager={true} options={slideOpts}>
    <IonSlide>
      {/* -- Support Card 1-- */}
      <IonCard class="support-card-1">
        <img src="./assets/images/phase1.jpg" alt="logo"/>
        <IonItem>
          <IonIcon icon={returnDownForwardOutline} slot="start"/>
          <IonLabel>Phase 1</IonLabel>
        </IonItem>

        <IonCardContent>
          Transition of second level students into Further Education.
        </IonCardContent>
      </IonCard>
    </IonSlide>
```

Figure 22: Information Slides [Slides]

8.6 Design and User Interface

8.6.1 Home Page

I believe that the home page is the most important page on a mobile application, as it is the first thing a user sees when the application is loaded. The ACCESS+ home page consists of an animation video explaining the program and big and colourful call to action buttons to grab users attentions and allow them to navigate to an answer about a question they might have had about the program.

Components used: Modal, Card, Button, Fab, Tab

Figure 23: Home Page (iPhone 11) (Light Mode)

Figure 24: Home Page (iPhone 11) (Dark Mode)

8.6.2 About Page

The about page contains details about the ACCESS+ program. Details such as what the program entails, their main focus, main goal, and reasons to pursue a further education course.

Components used: Modal, Card, Button, Fab, Tab

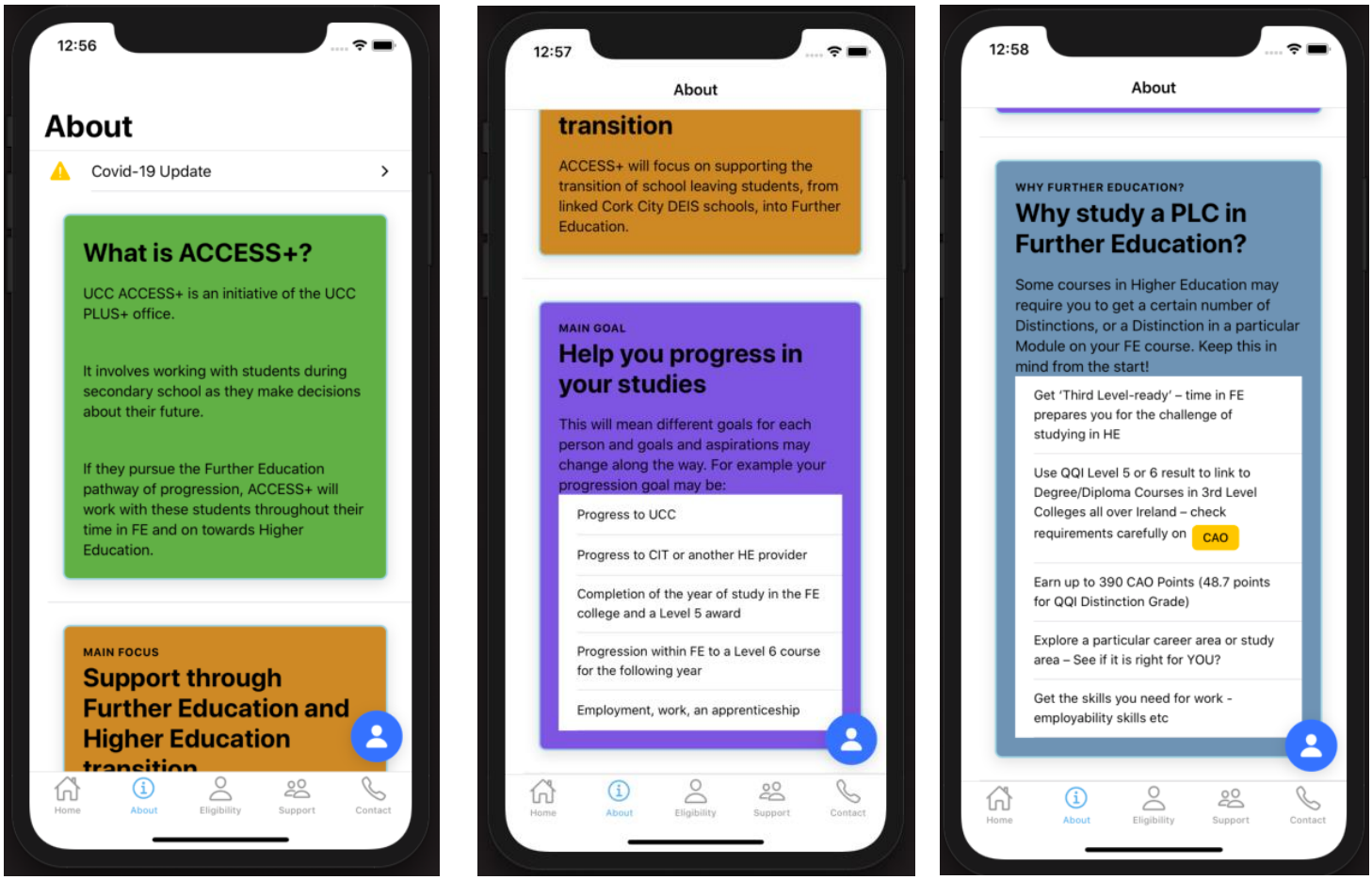


Figure 25: About Page (iPhone 11) (Light Mode)

8.6.3 Eligibility

The eligibility page provides users information about who ACCESS+ is for, whether if one is eligible to apply and how to apply.

Components used: Modal, Card, Buttons, Fab, Tab

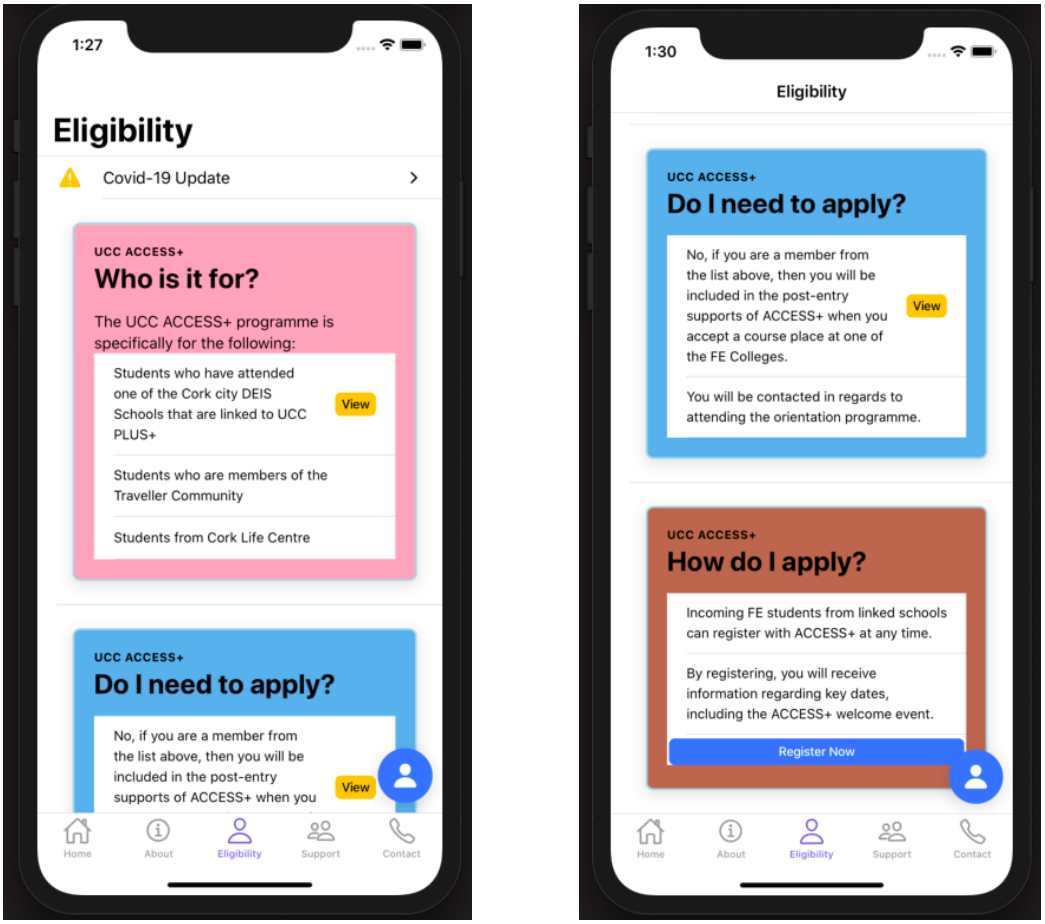


Figure 26: Eligibility Page (iPhone 11) (Light Mode)

8.6.4 Support

The support page contains the wide range of support ACCESS+ has to offer. From pre-entry and post-entry support to tips on how to successfully transition to college.

Components used: Modal, Card, Slides, Fab, Tab

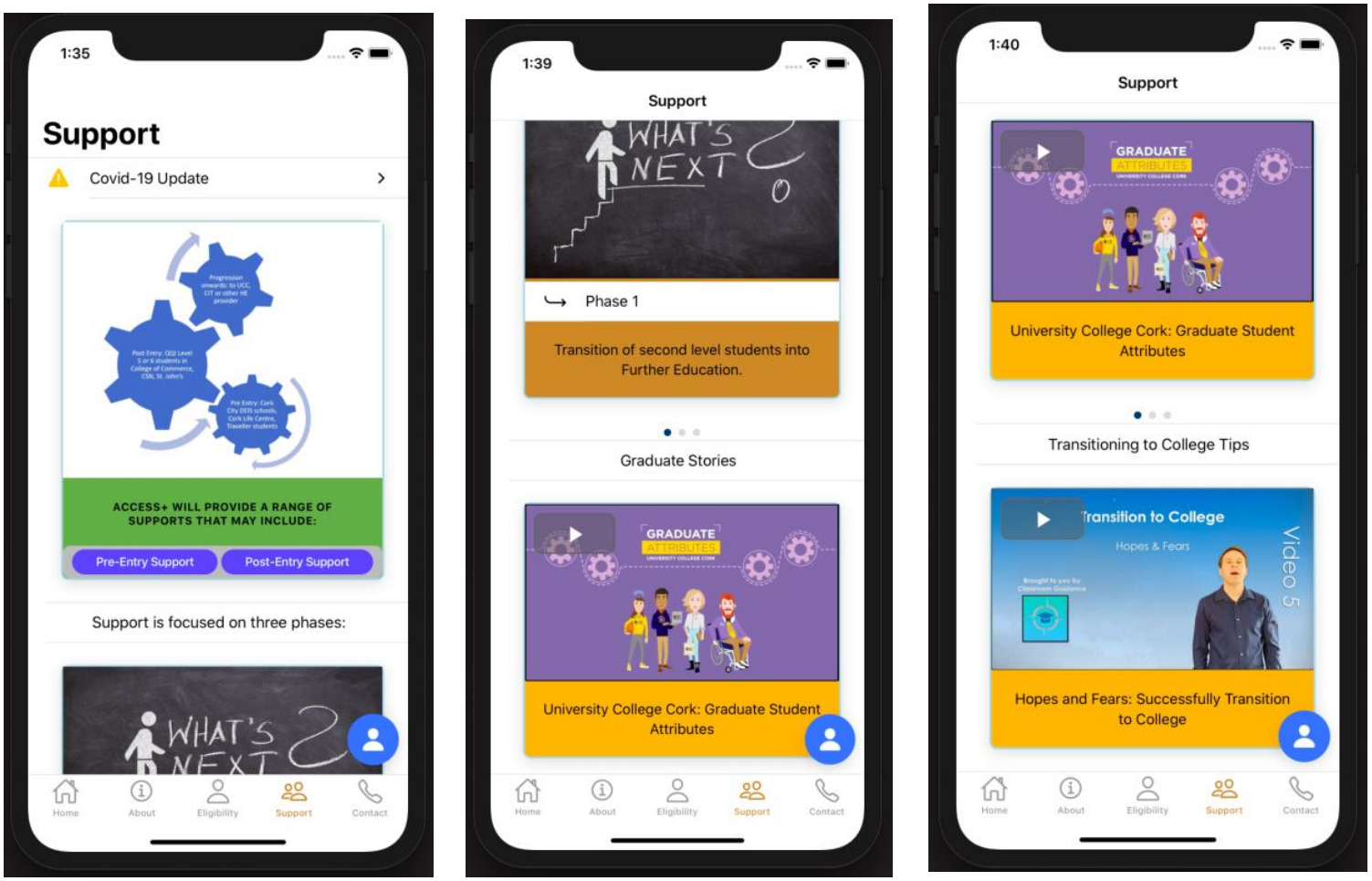


Figure 27: Support Page (iPhone 11) (Light Mode)

8.6.5 Contact

The contact page provides easily accessible contact information for any queries about the program.

Components used: Modal, Slides, Button, Fab, Tab

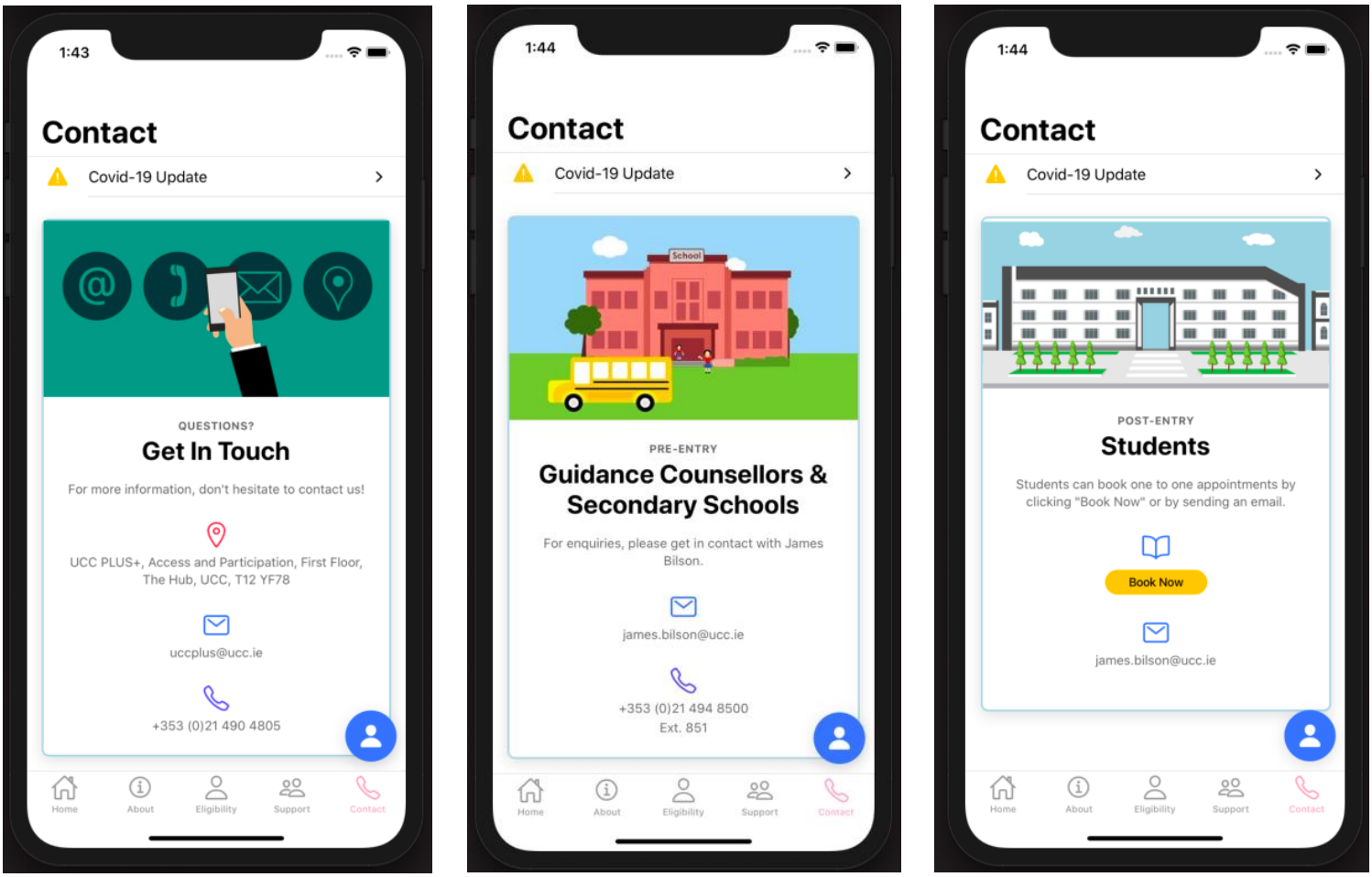


Figure 28: Contact Page (iPhone 11) (Light Mode)

8.7 Features and Functionality

The features and functionalities of mobile applications are what makes or break a mobile application. Below are some things that I took into consideration while developing the app, these stem from allowing myself to think like a user of the ACCESS+ application.

8.7.1 Simplicity

It is important for users how to operate and navigate the app without needing instructions. Cluttered and complicated UI can make it difficult to navigate the application. The ACCESS+ application avoids this issue by ensuring focus on a fully functional and reactive navigation bar.

8.7.2 Consistency

Consistency is another important aspect in a mobile application. Design and feature consistency increases usability and eliminates confusion. To achieve consistency, I ensured that every page have similar, if not the same layout. In order to avoid monotony, I would use different components to showcase information while sticking to the same layout the whole way through. This also applies to my colour and theme of choice, as mentioned previously I followed the UCC colour scheme to give users of the application a sense of familiarity.

8.7.3 Flexibility

Due to a variety of devices out there, it is important for the ACCESS+ to be flexible. This means that the application should be compatible with every screen size and resolution. From the devices I've installed the ACCESS+ app on (iPhone 11, XR, 8, iPad, Samsung Galaxy), it so far been adaptable to the devices listed above.

8.7.4 Quality Multimedia

Since the application contains multimedia like images, videos and animation, it is essential that said multimedia should be of high quality or high resolution, to make the user experience worthwhile. To assure this, I made sure to download videos with 720p resolution. In regard to images, I geared towards ".png" photos for a high resolution images and stayed clear away from screenshots.

8.8 Deployment & Installation

This is the stage in the development process where it is time to put the application to test on a real device, as opposed to simulators and emulators.

8.8.1 Requirements

In order to install an Ionic application into a real device, the capacitor must integrated and enabled. In my case, I had the capacitor integrated when I started a new project.

8.8.2 Building and Deploying for iOS

- Opened a new terminal in visual studio code and typed in "***ionic capacitor add ios***"
- Followed by "***ionic build"***
- Open XCode with "***npx cap open ios"***
- I proceeded to plug in an apple device into my laptop.
- I chose my device as installation location.
- Finally, I pressed run.
- I was met with permission issues, and I resolved it by trusting the developer profile in the settings, under the within the general options.

8.8.3 Building and Deploying for Android

- "***ionic capacitor add android***"
- "***ionic build"***
- Open Android Studios with "***npx cap open android"***
- I proceeded to plug in an android device into my laptop.
- I chose my device as installation location.
- Finally, I pressed run.

Chapter 9

9. Testing

9.1 Introduction

Testing is a very important aspect of creating a mobile application it is crucial to discovering how effective a piece of software is, it also provides information surrounding changes or improvements that can be made. It also allows users to pinpoint issues or defects which can be corrected. This in turn improves the quality of the application. Completing user testing provides information to improve the overall experience of the application, this is why having participants from the group the application is targeted towards provides very important responses. The first testing that I conducted was code testing, this identified script or complier errors. Followed by user testing where the participants got to try out the application and fill out a questionnaire based on the experience. Testing and finding participants was difficult due to the ongoing Covid-19 pandemic it was not possible to physically meet the participant to test the application, this reduced my testing pool as I was reliant on a small circle of people that I know and am in contact with. I conducted the testing in person with my close circle of friends and via Microsoft teams with other participants.

9.2 Usability Testing

Usability testing is a method which is used to test the functionality of an application, it tests by observing participants use the application to complete a task and ask for feedback. The main goal is to discover what elements of the application work well and what needs to be changed or improved in order to allow the application to run smoothly and avoid confusion. Testing the product can validate your prototype, as you can see if the application works well and if the user understands how to navigate the environment. It also confirms that the application meets the expectations of the user, that it does what is expected. Finally, it allows for errors and issues to be discovered and fixed. Unfortunately, due to the Covid-19 pandemic I had to complete this testing over Microsoft teams, while I was able to see the user navigate the application, I could not see their actual screen that was displaying the application this made it difficult to see if the user was having any difficulty or misunderstanding something unless they asked me a particular question.

9.3 User Testing

User testing is a method where the application is tested by participants who perform realistic tasks. The main purpose of the testing is to evaluate the usability of the application, this discovers if it is ready to be launched. This also makes it possible to see if the application is intuitive for the user. As my application is not on the app store or play store yet I sent a zip file of my application to the participants along with a questionnaire to fill out. Firstly, I instructed the participant to look at the UCC ACCESS+ webpage which was linked in the google form. After the user has navigated through the webpage and application, they were instructed to fill out a simple google form questionnaire.

9.4 Goal of testing

The main goal of the testing was to receive feedback to see whether the application was user friendly and informative. It also gives the opportunity for the application to be changed based on the feedback to improve user experience. Testing the application lets me see whether users understand and enjoy the functionality and content of the application. The testing will also ensure that the mobile application meets the requirements of the proposal.

9.5 Participants

I had a total of twenty participants. Five percent (1) was aged under eighteen, sixty percent (12) were between 18-24 year olds, fifteen percent (3) were aged between 25-34, zero percent were aged 35-44 and twenty percent (4) were aged 44+. Thirty five percent (7) of all participants were full-time workers, thirty percent (6) were secondary school students and twenty five percent (5) were higher education students. Eighty percent (16) of participants had not heard about UCC ACCESS+ prior to the testing. Eighty-four-point two percent of participants stated that they preferred looking for information on mobile phones instead of desktops.

9.6 Procedure

Once the individual had agreed to participate, I would send them a zip file of my application as it is not on the app store or play store yet. I attached instructions and a questionnaire along with the zip file, explaining how to download and install it on their device. I arranged a Microsoft teams call, during this call they viewed the current UCC ACCESS+ website which I had linked in the google form and the UCC ACCESS+ mobile application, they then filled out the questionnaire answering questions about the experience. I then thanked them for their time.

9.7 Results

The testing and questionnaires provided invaluable data and feedback. Twenty people participated in the testing. Only twenty percent of the participants had previously heard of the UCC ACCESS+ program, the pie chart for this can be seen in the figure below. Firstly, I asked the participants to browse the current UCC ACCESS+ website, I then asked them to fill out the first section of the questionnaire before looking at the mobile application.

Figure 29: Questionnaire Results 1

When asked how easy it was to find specific information about UCC ACCESS+ on the website from a scale of 1-5 one being very difficult to 5 being very easy, the majority of participants forty five percent rated a two on the scale. This shows that for the majority of people who participated they found finding information on the UCC ACCESS+ website difficult.

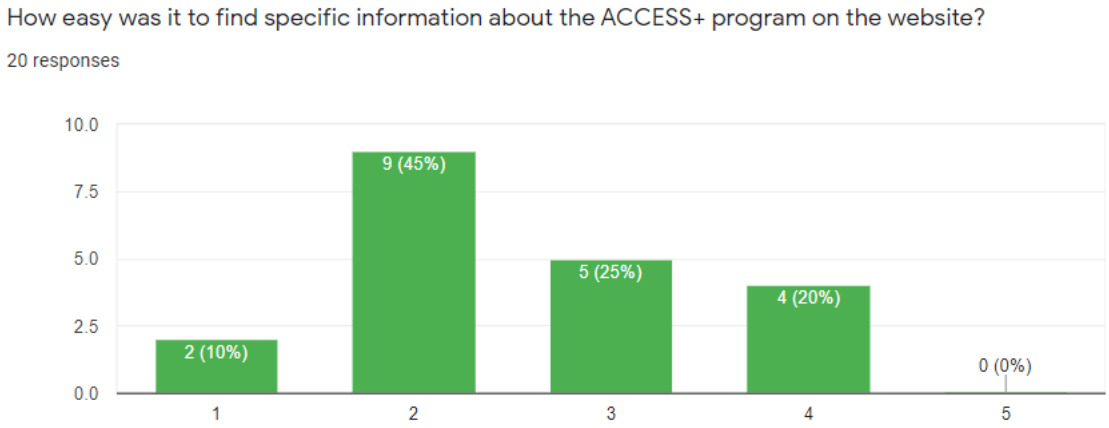


Figure 30: Questionnaire Results 2

This low score can be attributed to factors including how visually appealing the website is and how the content is laid out. The participants also rated the UCC ACCESS+ application. The website also scored lowly in these two sections. It can be seen that there is a link between poor design and content layout and participants having trouble finding information.

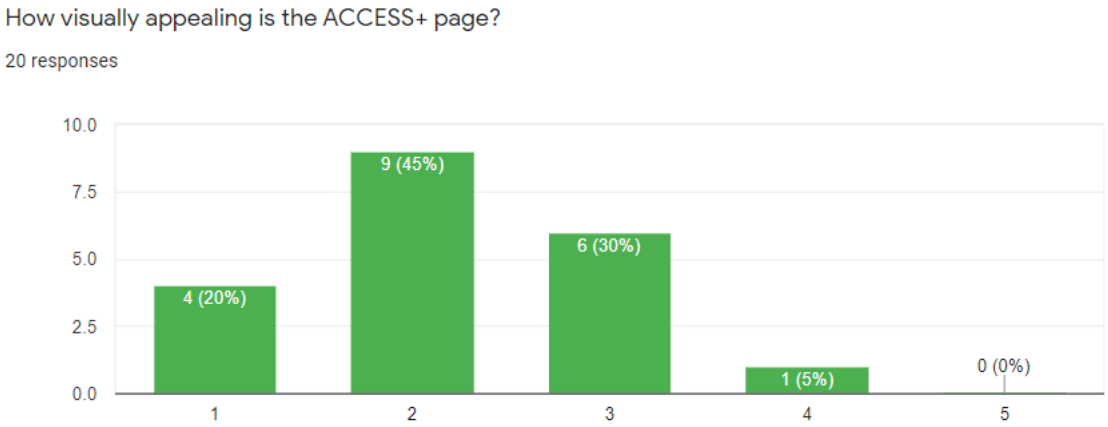


Figure 31: Questionnaire Results 3

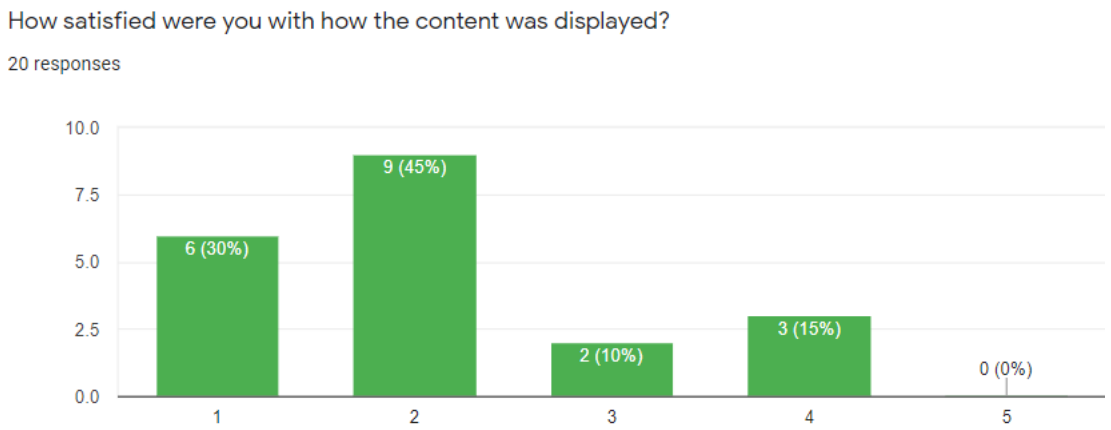


Figure 32: Questionnaire Results 4

The UCC ACCESS+ mobile application received much higher scores in comparison. One hundred percent of participants found it easy to navigate the mobile application.

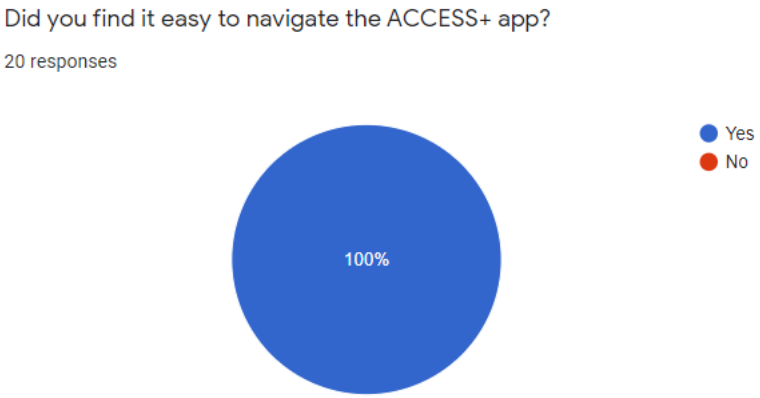


Figure 34: Questionnaire Results 5

This can in turn can be attribute to the design and layout of the mobile application. The majority of participants sixty percent scored the look and feel of the interface as a five. This can be attributed to equally high scores when asked if the application was visually appealing, the majority of participants seventy percent scored a five. Sixty five percent of participants scored a five on finding it easy to find specific information on the application. Seventy percent of participants scored the application a five in terms of content layout.

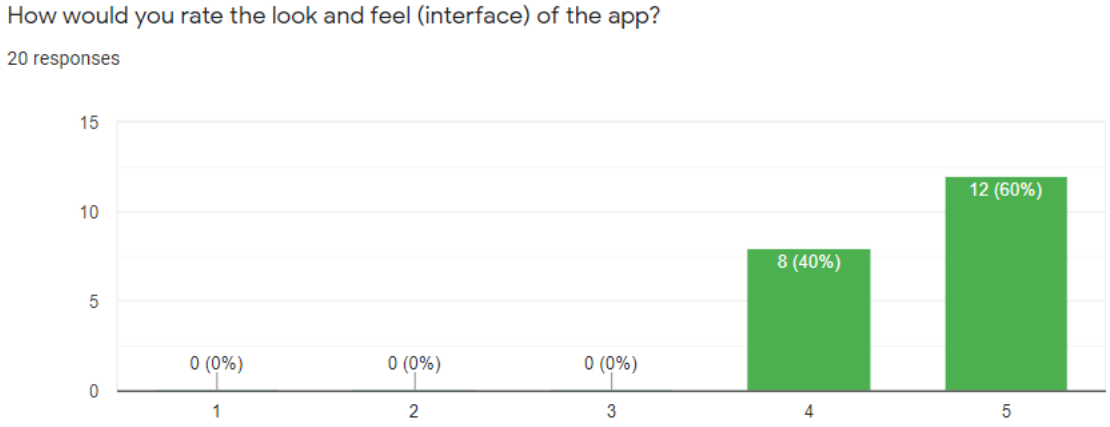


Figure 35: Questionnaire Results 6

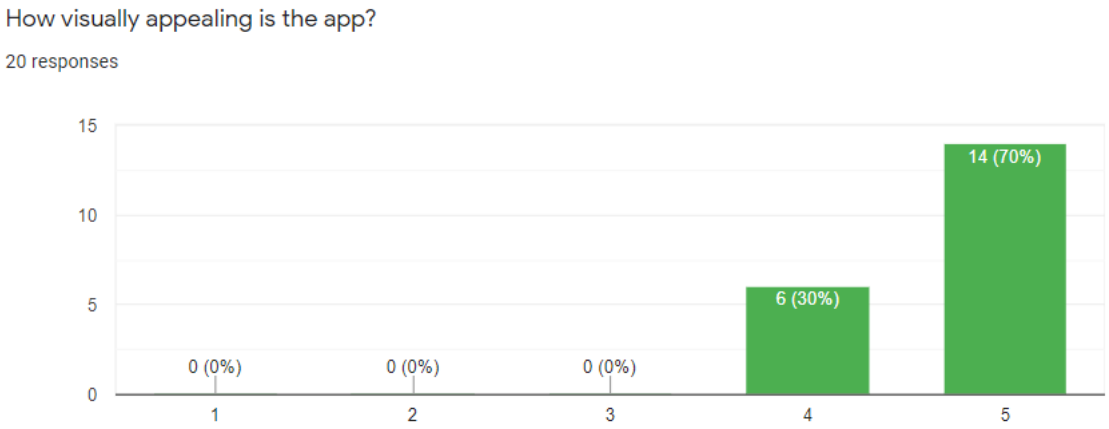


Figure 36: Questionnaire Results 7

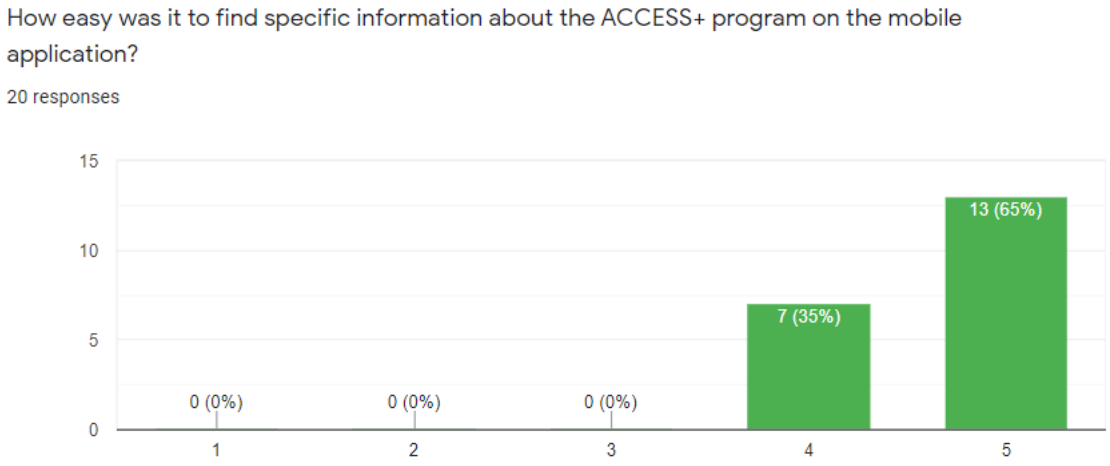


Figure 37: Questionnaire Results 8

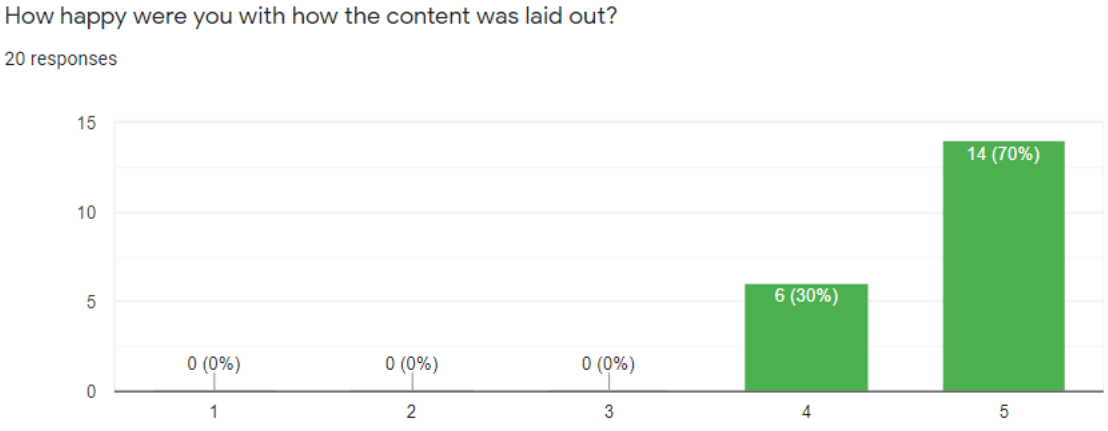


Figure 38: Questionnaire Results 9

This could also be attributed to the fact that eighty-four-point two percent of participants prefer to find information on mobile applications instead of using desktops. This could be due to the fact that mobile phones are more accessible and portable compared to desktops.

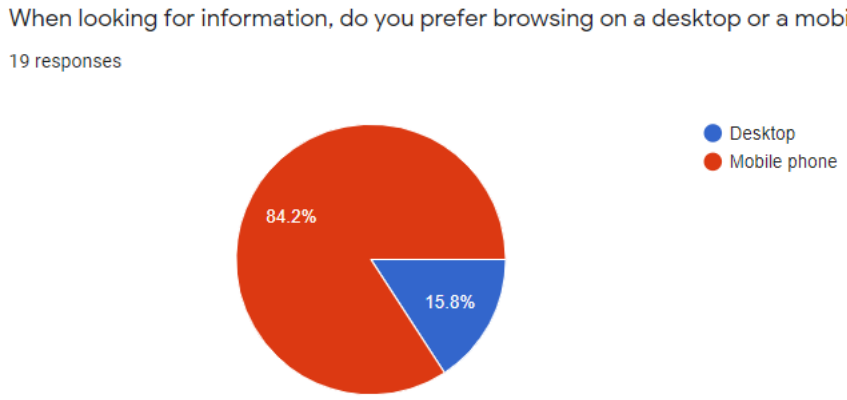


Figure 39: Questionnaire Results 10

When asked if they found it easier to find information on the website or mobile application, one hundred percent of participants stated that they found the mobile application easier to navigate. When asked why they would recommend the mobile application over the website the answers varied from finding it easier to find information which was forty percent, the application being more accessible compared to the website at twenty five percent, the application having a more concise layout at fifteen percent and finally ten percent of participants stated that the application had better design.

When asked to rate the overall experience with the UCC ACCESS+ app, sixty five percent of participants rated a five which is an excellent experience while the remaining thirty five percent rated it a four which is a very good experience.

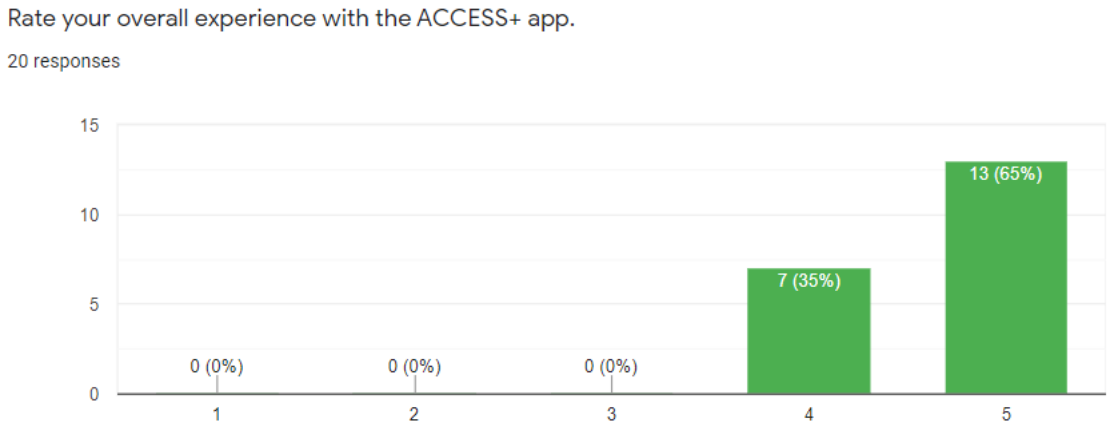


Figure 40: Questionnaire Results 11

When the participants were asked what they liked the most about the application, answers ranged from design at thirty five percent, to the informative videos at twenty five percent, the layout of the content at twenty percent, the explore section and homepage at fifteen percent and finally the colour palette choice at five percent. Based on the data it can be seen that the design is a very important element in whether or not a user will enjoy an app. This can also

be seen in a previous question where the participants were asked to rate the importance of a number of factors when browsing an app, including the design which ninety percent of participants scored design as extremely important.

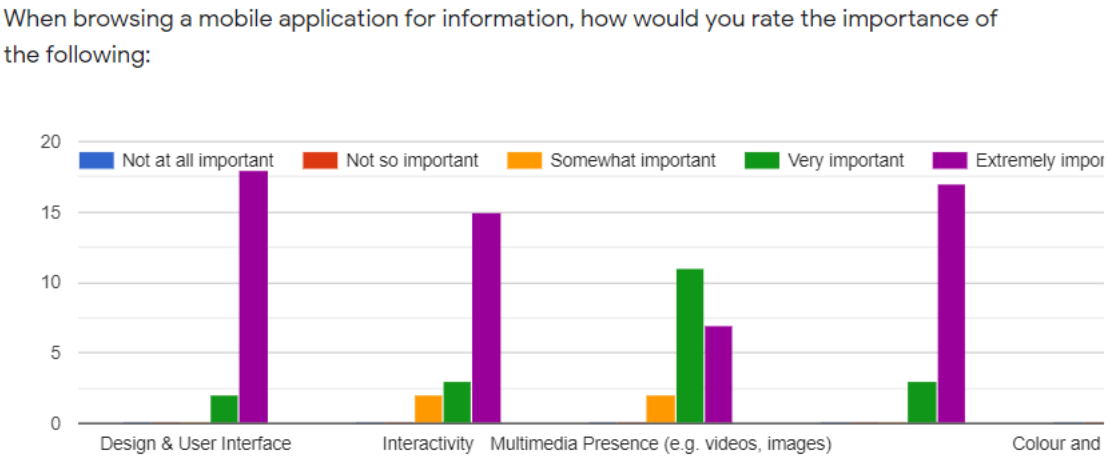


Figure 41: Questionnaire Results 12

Participants were then asked what they liked the least about the application. Answers ranged from twenty percent stating there was too much text in the app, ten percent mentioned the colour choices, five percent stated there was no search bar, five percent mentioned the need for clearer navigation buttons and the remaining participants did not answer.

9.8 Evaluation of Results

Based on the data retrieved from the testing and questionnaire it can be seen that participants preferred the mobile application over the website as it had a well-functioning layout and design. Participants also found it easier to navigate and find information on the app compared to the website and the addition of videos and animated videos explaining information added to the success of the mobile application. The majority of the participants also acknowledged

.

that they preferred to gather information from using mobile apps instead of traditional desktop searching as they view it as more portable and accessible. Overall, the participants enjoyed using the application, as sixty five percent rated the experience as excellent while the remaining thirty five percent rated it as very good. The user testing was overall a success as users found it easy to navigate the app and find information. While it was a success there is always room from improvement and some suggestions brought to my attention included, including more video and images to replace having long sections of text, to include a FAQ section and to have more specific information in regards to pathways from PLC courses to university.

Chapter 10

10. Conclusion

To conclude this thesis, I created a functioning cross platform application for UCC ACCESS+, the application was intended to be accessible to anybody who was interested. I intended to create a more user friendly and interactive environment for people to gain information about the UCC ACCESS+ program. Based on the research of a small group of twenty participants it can be seen that this was mostly achieved, as one hundred percent of participants found it easy to navigate the mobile application compared to forty five percent of participants stating it was difficult to find information on the UCC ACCESS+ website. This could be because seventy percent of participants rated the application a five, for how the content was laid out. I believe that the mobile application will be a useful asset for the UCC ACCESS+ students to find information in a clear and nicely designed format, the fact that the application will be able to be downloaded onto their device also means that they will not need to search for the website as it will be on their phone, this makes it more accessible to check for information on a regular basis.

10.1 Future Works:

Due to time restraints there are a few elements that I did not get a chance to include in this project, but I believe they are important and should be considered for future work. These include putting the application on the Google Play Store and Apple App Store. I believe having a sign in feature in the application and having the ability to send push notifications would have been a useful feature in the application and should be considered in the future. Based on the feedback from the testing I would also create more animated videos to show content as some participants found that the application had too much text but enjoyed receiving information from the videos.

Bibliography

Access Definition. The Glossary of Education Reform. (2020). Retrieved 27 August 2020, from https://www.edglossary.org/access/.

Animaker, Make Animated Videos on Cloud for free. (2020). Retrieved 12 August 2020, from https://www.animaker.com/

Annual number of mobile app downloads worldwide 2019 | Statista. (2020). Retrieved 01 September 2020, from https://www.statista.com/statistics/271644/worldwide-free-and-paid-mobile-app-store-downloads/

Ballantyne, M., Jha, A., Jacobsen, A., Hawker, J., & El-Glaly, Y. (2018). Study of Accessibility Guidelines of Mobile Applications. *Session 9: Designing And Studying Mobile Applications*, *9*. Retrieved 16 September 2020, from https://dl.acm.org/doi/pdf/10.1145/3282894.3282921?casa_token=vgDHZoj27vYAAAAA:BybUBZHbI_DB5ie-0yWfhnUNSpLuZyXfQ66yjr_R5GOxq0pVutk3zTaADlo2T9VKl71J_LbWK84.

Capacitor (2020). Retrieved 20 July 2020, from https://capacitorjs.com/

Canva (2020). Retrieved 15 July 2020, from https://www.canva.com/

DARE and HEAR. (2020). *DARE HEAR Facts and Figures 2017-2018*. Irish Universities Association. Retrieved from http://accesscollege.ie/wp-content/uploads/2017/02/DARE-HEAR-Facts-and-Figures-2017-2018-Summary-Report.pdf

Higher Education Authority. (2019). *A Spatial & Socio-Economic Profile of Higher Education Institutions in Ireland Using Census Small Area Deprivation Index Scores derived from Student Home Address Data, Academic Year 2017/18*. Retrieved from https://hea.ie/assets/uploads/2019/10/Higher-Education-Spatial-Socio-Economic-Profile-Oct-2019.pdf

McMullin, P. (2008). *The Evolution of University Access Programmes in Ireland*. University College Dublin.

McGuire, D., Collins, M., & Garavan, T. (2003). Tackling social exclusion at third level: A profile of participants on access programmes. *Irish Educational Studies*, *22*(1), 41-68. https://doi.org/10.1080/0332331030220107

O'Sullivan, K., Byrne, D., Robson, J., & Winters, N. (2019). Who Goes to College via Access Routes? A Comparative Study of Widening Participation Admission in Selective Universities in Ireland and England. *Social Inclusion*, *7*(1), 38-51. https://doi.org/10.17645/si.v7i1.1647

O Reilly, P. (2008). The Evolution of University Access Programmes in Ireland. *UCD Geary Institute Discussion Paper Series;*. Retrieved 16 August 2020, from https://researchrepository.ucd.ie/bitstream/10197/1832/1/gearywp200816.pdf.

React – A JavaScript library for building user interfaces. (2020). Retrieved 2 July 2020, from https://reactjs.org/

Scanlon, M., Leahy, P., Jenkinson, H., & Powell, F. (2019). 'My biggest fear was whether or not I would make friends': working-class students' reflections on their transition to university in Ireland. *Journal Of Further And Higher Education*, *44*(6), 753-765. https://doi.org/10.1080/0309877x.2019.1597030
IN TEXT: (Scanlon et al., 2019)

UI Components - Ionic Documentation. (2020). Retrieved 4 July 2020, from https://ionicframework.com/docs/components

Appendix

A. Animation Script

Text: Further Education can take you anywhere. UCC ACCESS+

Animation storyboard 2:
Two characters, students who are graduating from the College of Commerce are standing outside the college discussing their next step.
Character C – Congratulations boy, we made it!
24-26

Character D – thanks girl, we did.
27-28

C – How'd you get on?
29-30

D –I got what I needed and I'm heading to CIT to do Early Childhood studies.
31-34

C – Nice one
35-36

D - You know, I really wasn't sure about it 12 months ago. Being honest I didn't have a great build up to the Leaving and I didn't do myself justice. I was thinking of just taking a year off but I'd done a transition year placement in a creche and after talking to a few people I eventually decide to apply for the Level 5.
38-53

C – well it seems to have worked out!?
54-58

D – You know what, it has. I loved the course, it was challenging but hands on too, and I really want to take this study on now to the next level. How about you?
59-1.07

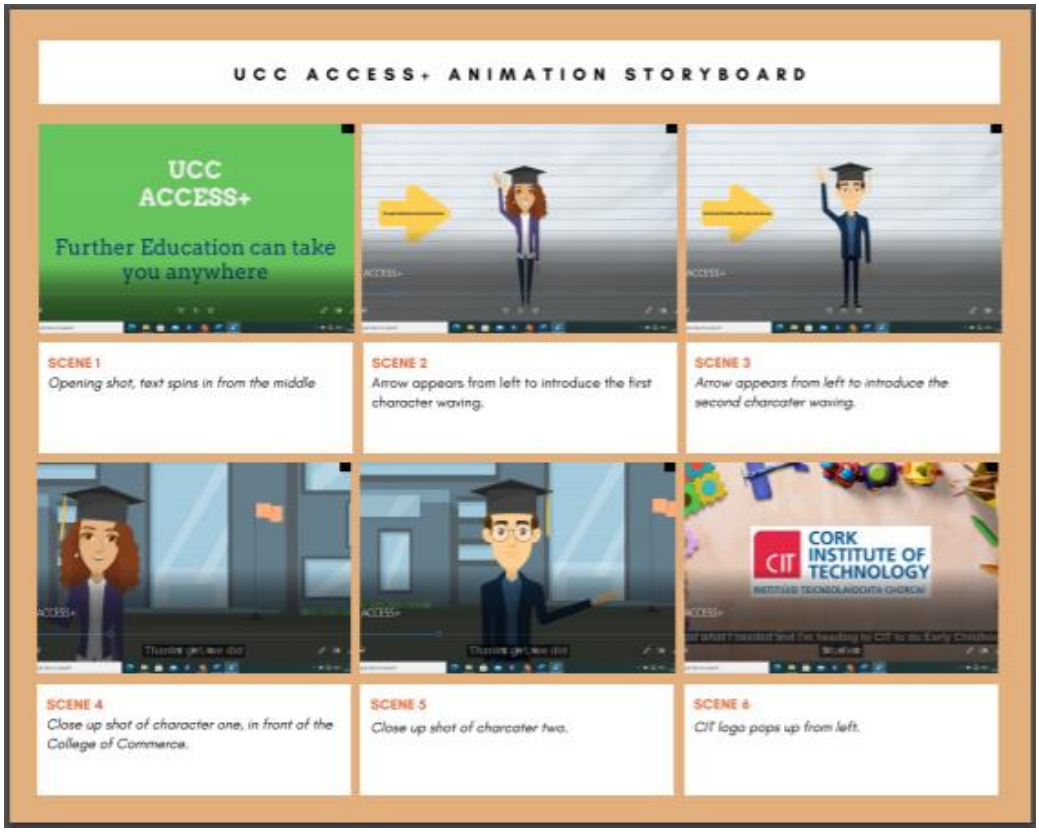
C – I got a Distinction and an offer from UCC for Law, I'm thrilled. I worked so hard for it but now it's a reality I can't wait to get started. If someone had told me a year ago that I'd be doing a Law degree I just don't think I'd have believed them, I just didn't believe in myself. But I feel so excited and confident. I just know now that I'm ready for Higher Level education.
1.08-1.30

D – Fair play to you.
1.31-1.32

C- Fair play to us!! (haha)
1.33-1.35

D – Onwards and upwards!
(Pan out from the 2 students laughing)
Text: Further Education can take you anywhere. UCC ACCESS+

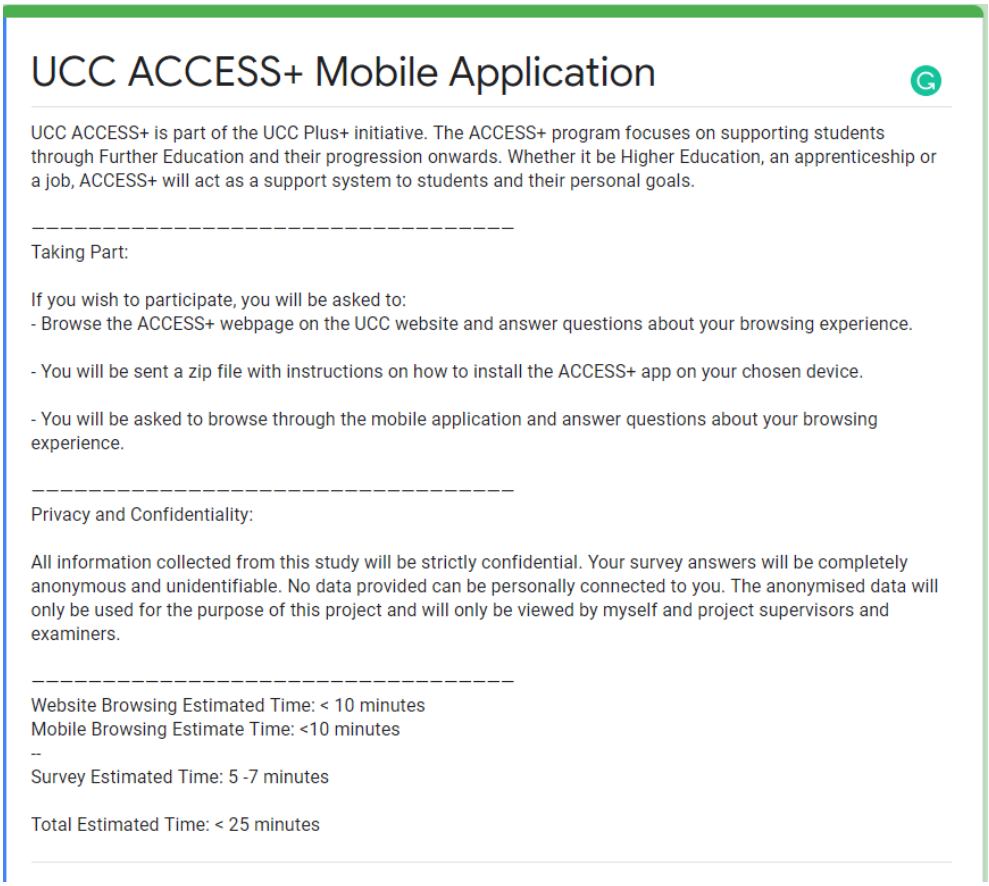
B. Animation Storyboard:



C. Questionnaire:

Online Link:

https://docs.google.com/forms/d/e/1FAIpQLSfnNhnZ7VIfMZs95qZX5ZTIfiKI3xnH2mpzzMo2ohcoGcH8Pg/viewform?usp=sf_link



UCC ACCESS+ Mobile Application

UCC ACCESS+ is part of the UCC Plus+ initiative. The ACCESS+ program focuses on supporting students through Further Education and their progression onwards. Whether it be Higher Education, an apprenticeship or a job, ACCESS+ will act as a support system to students and their personal goals.

Taking Part:

If you wish to participate, you will be asked to:
- Browse the ACCESS+ webpage on the UCC website and answer questions about your browsing experience.

- You will be sent a zip file with instructions on how to install the ACCESS+ app on your chosen device.

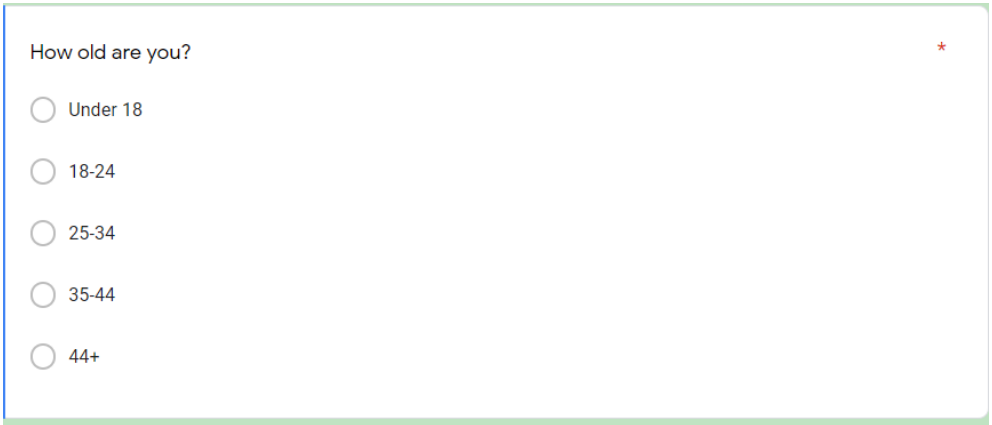
- You will be asked to browse through the mobile application and answer questions about your browsing experience.

Privacy and Confidentiality:

All information collected from this study will be strictly confidential. Your survey answers will be completely anonymous and unidentifiable. No data provided can be personally connected to you. The anonymised data will only be used for the purpose of this project and will only be viewed by myself and project supervisors and examiners.

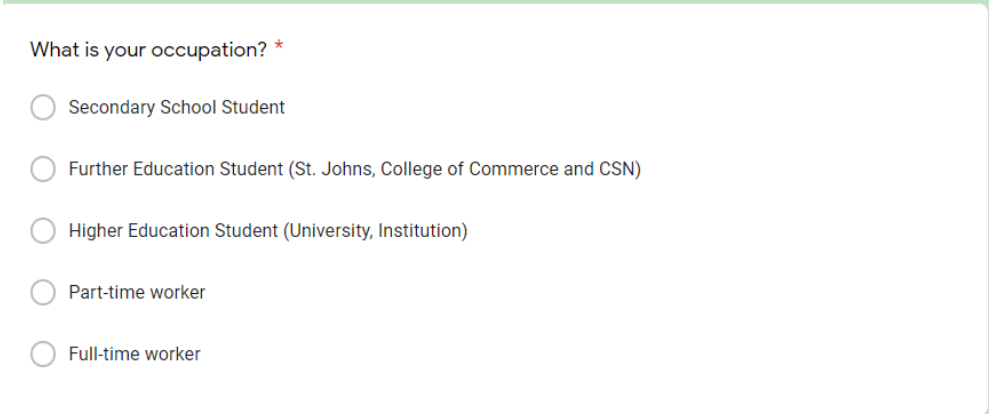
Website Browsing Estimated Time: < 10 minutes
Mobile Browsing Estimate Time: <10 minutes
--
Survey Estimated Time: 5 -7 minutes

Total Estimated Time: < 25 minutes



How old are you? *

- Under 18
- 18-24
- 25-34
- 35-44
- 44+



What is your occupation? *

- Secondary School Student
- Further Education Student (St. Johns, College of Commerce and CSN)
- Higher Education Student (University, Institution)
- Part-time worker
- Full-time worker

Are you familiar with the UCC ACCESS+ Program and the services they provide? *

- Yes
- No

ACCESS+ Website Questions

Website link: https://www.ucc.ie/en/uccplus/accessplus/

Please click the link above to the ACCESS+ website, kindly browse that page and answer the questions below.

Did you find out the answer to a question you had about the ACCESS+ Program? *

- Yes
- No

How easy was it to find specific information about the ACCESS+ program on the website? *

1. Not at all easy | 2. Not so easy | 3. Somewhat easy | 4. Very easy | 5. Extremely easy

	1	2	3	4	5	
Not at all easy	○	○	○	○	○	Extremely easy

How visually appealing is the ACCESS+ page? *

	1	2	3	4	5	
Not at all appealing	○	○	○	○	○	Extremely appealing

How satisfied were you with how the content was displayed? *

	1	2	3	4	5	
Not at all satisfied	○	○	○	○	○	Extremely satisfied

ACCESS+ Mobile Application Questions

After browsing the website and answering the questions, I kindly ask you to browse the ACCESS+ mobile application on the device provided and answer the following questions.

What device did you use the application on? *

- ○ Android phone
- ○ iPhone
- ○ Tablet
- ○ iPad
- ○ Other...

User Interface Design

Description (optional)

Did you find it easy to navigate the ACCESS+ app? *

- ○ Yes
- ○ No

How would you rate the look and feel (interface) of the app? *

	1	2	3	4	5	
Very unsatisfactory	○	○	○	○	○	Extremely satisfactory

How visually appealing is the app? *

	1	2	3	4	5	
Not at all appealing	○	○	○	○	○	Extremely appealing

Content and Layout

Description (optional)

How easy was it to find specific information about the ACCESS+ program on the mobile application? *

	1	2	3	4	5	
Not at all easy	○	○	○	○	○	Extremely easy

How happy were you with how the content was laid out? *

	1	2	3	4	5	
Not at all happy	○	○	○	○	○	Extremely happy

Was there information or content that you expected but did not find? *

Short answer text

Features and Functionality

Description (optional)

Which feature did you find the most useful/helpful in helping you gain more information about the program? *

- ○ Navigation Bar
- ○ Call to Action Buttons
- ○ Videos and Images

Was there a feature that you expected but did not find? *

Short answer text

Websites and Mobile Application

Description (optional)

Websites and Mobile Application

Description (optional)

When looking for information, do you prefer browsing on a desktop or a mobile phone?

- ◯ Desktop
- ◯ Mobile phone

When browsing a website for information, how would you rate the importance of the following: *

	Not at all impor...	Not so important	Somewhat imp...	Very important	Extremely impo...
Design & User I...	◯	◯	◯	◯	◯
Interactivity	◯	◯	◯	◯	◯
Multimedia Pre...	◯	◯	◯	◯	◯
Content Layout ...	◯	◯	◯	◯	◯
Colour and The...	◯	◯	◯	◯	◯

When browsing a mobile application for information, how would you rate the importance of the following: *

	Not at all impor...	Not so important	Somewhat imp...	Very important	Extremely impo...
Design & User I...	◯	◯	◯	◯	◯
Interactivity	◯	◯	◯	◯	◯
Multimedia Pre...	◯	◯	◯	◯	◯
Content Layout ...	◯	◯	◯	◯	◯
Colour and The...	◯	◯	◯	◯	◯

Did you find the mobile application or website easier to navigate? *

- ◯ Mobile application
- ◯ Website

Who would you recommended the ACCESS+ mobile application to? *

Short answer text

Would you be more inclined to recommend the ACCESS+ website or ACCESS+ app to someone who wants to know more about the program? *

- ACCESS+ website
- ACCESS+ app

Please explain your answer to the question above. *

Short answer text

Who would you recommended the ACCESS+ mobile application to? *

Short answer text

Would you be more inclined to recommend the ACCESS+ website or ACCESS+ app to someone who wants to know more about the program? *

- ACCESS+ website
- ACCESS+ app

Please explain your answer to the question above. *

Short answer text

Please explain your answer to the question above. *

Short answer text

Rate your overall experience with the ACCESS+ app. *

1	2	3	4	5
○	○	○	○	○

What did you like the most about the ACCESS+ app? *

Short answer text

What did you like the least about the ACCESS+ app? *

Short answer text

What did you like the least about the ACCESS+ app? *

Short answer text

Do you have any suggestions on how the ACCESS+ app can be improved? *

Long answer text

Thank you for taking the time to participate!

Description (optional)