

Beyond Words Choir App

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Abstract

This paper shows all my progression going from no experience in making a mobile application to having a functional good-looking application that hits the correct demographic. This involves everything from the history, brief discussion of the problem and the solution, then through all of the research that I did to make sure I knew how to approach the task and finishing off with the development process and a reflection.

To achieve going from not experience to a functioning application, I went start with prototyping and making a app design that I thought looked good, then I applied all of my research into this so it his the correct demographic, before meeting with my client to then also add the changes that they would like to see.

From a computer scientist's perspective, this paper shows just how much work there is behind an application which many people would usually overlook but this also shows how anyone with a little hard work and structure, is able to create a mobile application for any problem that they have.

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1. Introduction

1.1 Beyond words

Beyond Words is a community interest company that Travel from city to city all around the UK, recruiting people from schools in the area to put on a performance in a stadium near to show both the community and the children the potential that they really have along with for them to have some fun. It is a highly commercial venture also providing a huge social impact as it involves a choir of 1000 young people aged 8-23, with some participants coming from our most disadvantaged communities; there will be a different choir performing in each area. They are accompanied by a full orchestra and some world-renowned celebrities.

In each area the social impact is great, having many students from many different schools making connections and encouraging one another to be the best they can. With the amount of people in each of the performances, there are always connections created from all ages.

1.2 History

Beyond Words have delivered this event six time previously in South Wales. They have hundreds of stories from the young people who have been involved of how it has changed their outlook. During the preparation period for the show members of the Beyond Words Team visit every school and college involved to meet all the participants, they attend a mass rehearsal and then have a whole day with the team on the day of the show. This is a long day as they bring their lunch and tea with them. They have a full sound check in the afternoon as well as the show in the evening. In all the breaks the team members are with the children and the school staff helping them to prepare and play endless games to keep them occupied. Some have described it as the best day of their lives, and we are told by school staff that this is not an under estimation with their unfortunate backgrounds.

It is a concern that they get such a tremendous experience and then simply say goodbye. We also know that if we have a good relationship with the teachers then we can stay in touch with the young people and hear their stories but for many this is not the case.

The last show was at the end of term and then a new phenomenon took place as children were ringing the office directly to tell us their stories, to thank us for an incredible event and to tell us how they had changed. Sometimes there was a parent involved and sometimes there wasn't we realised that being involved, even though it is a large event, it was important to the individual that they needed to tell us their story.

Out of that situation has grown the need to have ongoing contact with the choir members. We first thought of an electronic newsletter that they could respond to but that involved emails addresses and the confidence to write something completely unstructured, which for the younger end of the choir would not work.

1.3 Problem

After the show is complete, there is then close to 1000 people wanting to say thank you, tell their story and give feedback on what they liked and disliked. Along with this, you have many younger members of the choir that have just made friendships, now having to say goodbye, not knowing if they will ever see their friends again or know what they are doing.

After the members have just had for some of them “The best experience of their lives”, we do not like to leave them, now upset that they are losing, not just the experience and staff members but also the bonds that they have created. For disadvantaged young people, making friends can be one of the hardest things in the world and making friends that then get taken out of their lives make this even more difficult.

1.4 Solution

We have found that the members in the age range between 8 and 12 years old are the ones that find it the most difficult to get in contact or to stay in contact with others of their age range. The solution to this is going to be a secure and monitored closed application that only member between the specified age range will be able to log onto.

The application will be there for all members to feel like they are still part of the community and we have not gone too far. To tackle the members wanting to give feedback, say thank you or to tell the staff members their story, there will be a messaging section that only the Beyond Words staff will be able to see. To make all the children still feel part of the community and like they are all still connected, there will be many different functions that they can use.

The members will have a news page where they will be able to tell everyone what they are going that day, or read what others are going. There will be a Music page where they will be able to make music and post it for all to listen to and show just how much they are improving. There will be monthly challenges where the children can do things such as making shoe boxes for the homeless. There will be a competition page for things such as wordsearches that members can download, complete, and send in to try and get prizes along with compare with others on how they did. Finally, we have a comedy page, the comedy page is where members will put up their jokes, others can then read them and rate them. At the end of each month, a staff member will pick the top 3 and the worst 3 jokes for a bit of fun and showing that the Beyond Words company is still part of this community. These jokes will then be pinned to the top of the page for all to read and enjoy.

1.5 Challenges/Limitations

1.5.1 Time

The main challenge and limitation within this project is the time that I will have to complete it. To create a whole application (Piyush Jain, 2016) takes around 37 weeks which is a lot more time than I had. I am lucky that I am only looking to provide a proof of concept meaning I would be able to cut off some of the weeks, but overall, I am still on a difficult time scale and any lost time could be devastating.

Time will be a huge limitation as it means that I will not be able to add in some of the more advanced features such as peer to peer communication as this would need a lot more set up than I have time for

1.5.2 Experience

I have never made an application before, meaning before starting this project, I did not know the normal way that people would go about starting an app, I had to put more research into this taking up even more time and having no prior experience meant I was not very confident starting the project as it is a scary concept.

As explained before, I have lots of experience within python but none in the specific module Kivy which is the GUI and cross platform part of the program that I would need to understand before any development started. Even though there are some great tutorials and teaching out there to help, with Kivy being such a large module, this was still a lot to learn in a small amount of time and

1.5.3 Client Demands

I do not have too much experience working with clients, and no experience working with clients that are not in the same field as me. This is where the challenges come in, the client has many ideas and many more that they are still thinking about and looking to give me throughout the project. This means that even after the original planning is complete and signed off with the client, they have new Ideas that they would like added. The planning done is primary based on making sure that I have enough time to do everything within the plan, If more features are being added without extra time, this is where the challenge arrives as I won't have time to do everything.

The other issue is, when working with a client, you can show them what you are doing and how you are going to do it and how it will end up, and a lot of the time it will be understood and it will all be okay. But there are times where they client agrees with you as they do not understand what the feature really is and then you get a problem where you have created a feature that they don't end up liking and don't realise they have already agreed to, and then on the time crunch you need to change it.

2. Background

2.1 Demographic

The audience for this application is going to be children between the ages of 8 and 12 years old. This means that there are going to be little nuances that are staples in the kinds of application that they are using, that I do not yet know about. The majority of the children that are going to use the application will be coming from a disadvantaged background, this is more impactful than I first

realise for example, as it is a high possibility that the users will not have internet all the time meaning looking into making the application work when offline is going to need to be considered.

2.1.1 Trending apps

To start I will be looking into the top trending apps for children of the same demographic. Currently, the top three applications are Bubba, Endless Alphabet and Minecraft. The similarities that all 3 of these apps have is that they are games, this shows that one of the most attractive aspects of applications is fun. All three of the applications are also very colourful with many bright colours anywhere you look. This is good as it means that I will be able to make a colourful application which is sometimes easier than a clean design as it can get difficult to fill the space, but here I will be able to fill any blank space with colour that the children will enjoy.

Bubbu is an app where you are looking after an animal, playing mini games with it and also visiting friends. After talking to some children who play the game, I have found that the main aspect of the game that they seem to like is the socialisation. The user is interacting with the animal, getting it to cook, visiting friends and going to play games with it. This game makes it feel like the you have a virtual friend on your phone. This tells me that within my app I am going to need to make sure that the users are able to get a real feel of connection when they are uploading their news, sending in their jokes etc. This will be very interesting as I will need to make sure that with my app does not just feel like they are uploading as a thing for people to scroll past, but more they are uploading for users to read, enjoy and have that community connection.

Endless Alphabet is a game where children are given different tasks and puzzles to help improve their ABC's. In this game you have little tasks such as being given a word and then you have to get all of the letters on how to spell it. After having some children play it, I found that the reason that they enjoy it so much was for the educational process and the self-satisfaction as they improve. For my application, I will make sure that I have features that will also hit the self-satisfaction for the users through the method of competitions and challenges.

Lastly, we have Minecraft Pocket Edition. Minecraft is a game where you are looking to survive and thrive in a world of limitless possibility, where you can build what you want or mine for ever. In this game, the children get to decide what they find fun from building, to gathering and onward to fighting and playing mini games others have created. The main attraction to this game is that the children decide what they want to do and have all of the tools needed to get it done. For my app, I will be looking to make sure that I give the children enough options possible on different things that they are able to do, to help satisfy as many users as possible, all at the same time. The way this will be done is from the app having ways for users to sit back and read what other children have been up to or get hands on with a challenge depending on how they feel. Along with this I will be making sure that there is a large range of challenges and competitions that the users will be able to take part in from wordsearches to outdoor adventures.

Next, I am going to look at other articles that cover this topic. The first article (StuartDredge, 2015) tells us how storytelling is a big part of enjoyment for children as they are able to use their imagination to immerse themselves into the situation described. They also enjoy this as it is a consistency that they are used to in many of the games and books that they are playing with and familiarity helps overcome the confusion of a new app. Within the app that I am creating we will include storytelling by enticing the users to upload jokes is a story telling way, along with also

uploading their challenges and competition entries with a story on how they accomplished the task. The best few stories could then be uploaded for the users to read and enjoy. For the users who also did the same task they will also be able to learn from this and see what they did the same, what they did differently and then reflect on if they prefer the way they did it, or the other user for if they were to ever do a task like this again.

Next this article says about in-app purchased being a sore topic as it entices the children to want something that is put behind a pay wall and then pressure is put onto the parents to buy the extra features that they want. As the audience we are hitting will be many disadvantaged children, the likelihood is the parents would not be able to put money into the application and this could cause a toxic environment, because of this all of the content within the application is going to be free and completely unlocked to all users.

Lastly, we have an article that is just on 2021 trends within apps as a whole (Manchanda, 2020). The first point that this article makes is about new apps including foldable phone technology as these are predicted to be the phones of the future. As our Target audience will have older phones due to their age and financial situation, I feel it would be useless for me to put in foldable technology at this time as it would be many years until the majority of users for this app would have foldable phones and by this time, we will know if foldable phones really are the future, or just a fad.

The article goes on to speak about how wearable integration is a new trend as the upswing on the amount of people getting smart wearables is increasing rapidly. The good thing about smart wearables is that there are many off brand versions that are cheaper than the main brands flagships. This means that there is a high possibility that there are users of this application that will have a wearable such as a watch. Because of the time limit that I am on, there would not be a way for me to make a functioning version of the application on both a phone and a watch, so instead the integration that I will be going for in respect to smart wearables will be push notifications as this will then appear on their wearable and they will be able to go on their phone and have a look what has been updated.

Lastly, this article says how extra security to promote the app is a good way to go as crime is transferring from real world to digital. Especially with the age of my audience, I have put a lot of thought into this sector and I will be go over everything I am looking to a little later, but the main security that I am going to have is that this will be a closed system where users are given a username and password at concerts so that they are able to log in, this prevents others registering to this app if they are not part of the community.

2.1.2 App Styles

When it came to the app styles, the way that I looked into this was by downloading ten different children's app, using them to see what consistencies I could find and then passing it off to my younger family members and seeing what they liked about it.

The main consistencies that I found is that when the apps needed to use shapes, they either decided on very basic normal shapes that you would see for buttons etc. or they would go on the whole other side of the scales and have all unique and fun looking shapes. There did not seem to ever be a mix of both unique and basic shapes. After seeing this I then went into a test document and made 3 basic screens, one with basic shapes, one with unique shapes and another with a mix of both. The problem with the one with mixed shapes is that the screen looked so busy that you never knew

where to look. The unique shapes mock-up did look good, but the amount of time that it took to make the shapes, I feel did not add all that much to the design as a whole and was not worth the time. This means that for my design I am going to use basic shapes that look clean but still fun and interactive without being too busy.

The other aspect of these apps that I investigated was the colour schemes that they used. Going into this I thought I was going to find that all the applications were going to use colour harmonies (TigerColour, 2015). This was the case for half of the application, but the other half of the apps seemed to be random. This showed me that I would have the creative freedom to break off from the original schematic and use the colour scheme that I have already come up with in my head. This made me a lot more comfortable for when it comes to the design process.

2.1.3 Parental Issues

The age of our demographic means that any application that are being used are going to need the parents' permission to use. After looking into a few articles (Dashlane, 2020), I found this to be a lot more relaxed than I originally thought with the blogs basically just saying to check basic permissions and then scan over the app permissions. Even though this shows me that the majority of users will be okay looking over a few permissions and letting their kids on the app. I know there will be a few parents that will want to go a bit more in depth and want to know more. For these people I have 2 options that I will be looking into, firstly we have a page within the settings of the application, where the parents will be able to see all of the different permissions, data stored, where the data is stored and also if they want they will be able to see how the data is stored making sure it is as safe as possible. The other route will be, when we are handing out the usernames and password, we will also offer a sheet for the parents that will do into detail on how we are keeping the children on the application safe.

I have also spoken to Beyond Words, and they are going to have moderators on this app to double check there is no bullying, negativity or swearing. From my perspective, this means that I will need to add moderators accounts that have the ability to add, remove or edit posts along with banning, deleting or warning users that what they are doing is against the terms of service on this application and they need to stop before they get into more trouble. This will take a lot of time and this may not get done within the proof of concept that I am making within this project.

2.1.4 Emotions

As children feel emotions in a more intense way than adults (Kolitz 2018), I will need to make sure that I am thinking about the way that they will respond to different parts of my app and making sure that it is giving off positive vibes to keep all of the users smiling. The main aspect of an app that will affect the children's emotions is the colours, there are many colours that children will see and it will instantly make them feel, sad, happy, excited, angry etc. (Fredericka 2018).

This is going to be a lot more important in my application than most realise as even though it isn't something the children actively think of, it will be changing the way in which they are thinking about me application without them even knowing. There are a few colours I am looking to use on certain pages to make sure that the correct message is coming across in the colour scheme and making them as comfortable as possible on each page.

The colour Yellow is associated with happiness, because of this I am going to want to have this as the main colour on the main pages of the application as in the grand scheme of things I am looking to

make an app that is improving the connection that children have to make them happier. As the main screens are the ones, they will initially see along with be on the most, this is definitely where I want them to see this colour.

Next is the colour green, this colour is associated with children feeling calm and safe. For this reason, I will be looking to use this colour on the page where users will be leaving messages for the staff members such as feedback or telling them a story, they don't know who else to tell. If I use green here, It will make it so the children feel like they are in a safe place where they can speak freely and not just tell us truthfully what they think about the show, but will also be able to tell us about struggles within their life that Beyond Words may then be able to help with, this could be a large range from needing help with class or homework to abuse within the household. If another colour such as a dark blue or purple, this could make the children feel sad or depressed and may get too anxious to share their story.

Lastly, we have the colour pink, pink gets associated with Love. This is a difficult colour as it is also associated with girls and I will need to make sure that users don't see too much pink that they feel they shouldn't use it. I would like to use pink on the pages such as the news where the users will be sharing with others as if the other users are feeling affection, they are more likely to react to the post in a positive way such as liking or reacting more thinking that they are really making a difference. Overall, this will mean more peer-to-peer interaction and will keep the community spirit going.

2.1.5 Location

The location of the audience will have an impact of the types of thing that the users enjoy, and as I do not need to worry about users being world-wide, I will be able to make the app more specific to the types of things that users in the UK like. The largest impact that this will have on the project will be within the music page of the app. The reason for this is because when you are looking at music the US (Statista, 2018b) will like different genres of music than people from the UK (Statista, 2018a). As I know my audience will only those in the UK, I will be able to personalise the music on here to what the users of the UK like, and if there are any music challenges or competitions, these will also be able to be created with the thought of the genres that the majority of people in the UK listen to.

2.1.6 Internet Connectivity

Many of the children I am making this application are coming from disadvantaged homes and after some research there is a high possibility that some of them will not have internet at their homes as there are a minimum of 300,000 children still without internet at home (Chris Davies, 2013). To counteract this, I will look into if it would be possible to make an offline version of the app that they would be able to update when they have internet and then when they go home, they would be able to see all of the new information from the point that they last had internet. As there are many places such as city street, cafés and schools that have internet, doing this would mean that the children without internet would be able to see the news that is only a few hours behind. They would still be able to react to different comments and post comments and challenge submissions themselves, they would just go public when they next get internet. This isn't the most ideal situation, but it is the best solution that I can think of, it is similar to the way that Facebook deal with offline users.

2.2 App Norms

When looking at app norms, I was not looking to investigate apps that are similar to mine, but more the apps that the majority of children use on a regular basis (Statista, 2019) and see if there were any crossovers, this means that even if one is a game, another is a social platform, it did not matter as I am looking for features that children see in all of these apps and recognise as a specific feature.

2.2.1 Button Design

After seeing that many children use both Facebook and Snapchat, the consistencies within the buttons that I found was the way that you upload and add things to your story, status etc. This was a little circle with a plus button inside. This represents to me that when I am looking to get users of the app to upload things, I should make sure I am using a similar button as this is what they will be able to recognise as knowing how to upload. If I use something different, they may find this confusing as I would be changing the social norm.

2.2.2 Display

When it comes to the displays of the apps, I found that many of the apps had very clear displays with not much going on. I think this is because the primary audience for these kinds of apps are teenagers and adults over children. For this reason, I will not be looking to follow the trend of clean monotone pages of my app and will instead be having lots of colour and fun all around the page.

2.2.3 Navigation

All the different apps that I went on seemed to follow a few of the same rules. Firstly, when you are going to a previous page that had already been visited, this would be suggested by the page swiping to the right of the screen. But if you were going forward to a new page that you have not yet been on, then the page would swipe to the left as if you are progressing through the app. This gave the app a good feeling of progression and I will be looking to take this into account when I am in the development stage.

Another consistency with both apps and websites is that you are able to press either the title of the page or the company logo, and this will take you back to the main menu. I will include this within my app as the way that users are able to get back to the main menu, this will mean that I can make each page have less clutter needing a back button.

Lastly, on all but one of the apps that I have been looking into, you were able to swipe the screen to the right to go back and swipe the screen to the left to go to the next page (if there was one). This is also another feature that I will add if I have time and if it is not too difficult, as this will then give the users many options around navigation as possible.

2.2.4 Platform

There are many different platforms for mobile, many that I have never heard of. After a little research (Statista, 2021), I was shocked to find out that all of the other mobile operating systems apart from Android and iOS only hold less than 1% of the overall market shares, with iOS holding 27.5% and Android as a staggering 72.5%.

After this shocking discovery, I decided that there is no real point for me to look into making my app compatible for operating systems that are not Android or iOS as there are less than 1% of people on these systems and my time is very valuable within this project and this would be a waste of my time.

When it comes to the app being on both Android and IOS, as there are around 3 people using Android to every 1 on IOS, this is one of the two reasons that I will be looking to primary code a app that is for android, and then if I have more time or continue with this app when this projects if over, this would be something I look into. Another reason for me to pick Android over IOS would be the deployment cost (Appy Pie, 2021). For Android, you have a one-off cost of £25 that means you are now able to deploy an app onto the Google Play Store, If you are looking to deploy your apps on the Apple store, there is a annual cost of £99, this is not just four times the amount of the Google Play Store, but you have to renew again every year. For this project I have not had any funding so this would not be something that I would be able to afford.

3 Research

3.1 Research Methods

3.1.1 Primary Research – survey's

My initial Primary research until the app is at least functional will be to use Survey's that will be given to parents to do with their children. The surveys will be looking at asking the children questions such as the colour schemes that they like the most, the shapes they prefer, what the like about the design, what they would like to see on the app, what they do not like. My hope is that the questions such as the colour schemes will correspond with the research that I have done on using yellow for the main menu etc. As if it does not, I will be torn on what to do as on one hand they children could be correct, but then on the other, I may not have a big enough sample size and in reality the majority do prefer the colours in my secondary research. As for finding out things that the children like and dislike about the app, if I am finding any consistencies such as all of the children don't like a specific feature, I would be able to catch this at an early stage before development has started and either research how to modify it to be liked or to remove the feature completely if on reflection it is not needed.

3.1.2 Primary Research – Demo Testing

After the app is in development and functional, I will then be looking to give a demo version to a group of children ranging in age between 8 and 12 years old to see what they think, see if they are able to use it without too much confusion, or if I need to simplify it. This is the stage where I find out if all of the research that I did came up with the correct results as if my research was good, there should only be minor changes needed as nothing is perfect first time. But if my research does not work out, this is where I could be looking at having to redesign the whole application to work for them. On the tight timescale that I have, I am not sure this would be possible, if this is what ends up happening.

3.1.3 Secondary Research - Websites

For my secondary research, the majority of the research that I will be doing will be from websites using blogs and articles that other have written. The reason for this is as when it comes to book, I find that most are outdated or cover a broader spectrum than I am looking for. As we are now in a digital age where everyone puts their views and research online for others to read, there is endless amounts of information on every topic imaginable. With this in mind I will still be making sure I am using the most reliable source possible as there are better and worse places for information (Formplus, 2007) on the internet, for example unless unavoidable I would not use a comment of one

users personal view on a forum, instead I would look for an article that has its own supporting research and references that proves the author knew what they are talking about.

3.1.4 Secondary Research - Books

When it comes to using books for my research, I will try and stay away from them for things such as trends and other topics that get outdated quickly, but I will use them for timeless topics such as programming. When it comes to programming languages, there is not much at all that changes over the years meaning, if I am looking to learn something and I see there is a book on it, even if it is 10 – 15 years old, the majority will still be relevant, and I would use this to help me learn. For this reason I used a python reference book (Amazon, 2021) from many year ago, for any help I need when coding. This has come in very handy for the little bits you forget within a language such as keywords or syntax.

3.1.5 Secondary Research - Documentaries/videos

I have used documentaries and videos more for person research than something I will cite on this report as they were more to give more a larger understanding of different paths that I should look down for my app. For example until watching a video on how colours change children's behaviour (Hempel Decorative Middle East, 2015), I would not have known this was a potential avenue I would need to investigate and make sure I follow. As I am able to listen to videos and documentaries while doing other tasks such as coding, they have been one of the most efficient research methods to help me on my journey.

3.2 Similar Products

As the application I am creating is going to be a closed private app only for the performers of Beyond Words, I do not have to worry about competing with other apps to make sure that I get the users over them. This means when looking at similar apps, I will be looking to see if there are any ideas that are good, and I could take inspiration from.

When looking for apps of a similar nature, there was not really anything that closely resembles what I am trying to do, I couldn't find an app that was looking to get children to socialise in a safe manner where they don't directly talk to one another but instead upload jokes, participate in competitions and challenged, or have a place they can voice their concerns.

As there was not one app that would cover all of the point, Instead I thought it would be a good idea to look for apps from the different sections of mine. First, I looked for an app for children's jokes. Even though there are a lot of apps that you can download and read jokes from (Appgrooves, 2021), I couldn't find a single on where the children could upload their own jokes for other users to read. This doesn't mean it was a complete loss though as I was able to look at the way some of the apps were structured, many seemed very basic where you just had text dumped on the screen and sometimes the background would conflict making it hard to read. Others had it so the jokes were in a box to make sure that everything was simple to read but overall, the design still looked pretty basic. This is what gave me the idea to do my jokes like a message box, so a screen with many jokes on would look like text conversation children are used to. This means I will be able to make sure all the jokes are readable, and the app will have a modern touch.

Next, I investigated competition and challenge apps to see if there was anything that stood out. The one thing that they all had in common is that they were challenges that you were able to do on the

phones such as a word search with an animated display or a crossword with the same types of animation. After speaking to my client, they want to try and make it so that the users are not on the phones too often as this can be bad for them. For this reason, I have gone for a more original design where the different competitions such as word searches will be pdf's they are able to print off and then complete and the competitions will be set instructions or tasks that they will do in real life and document through pictures and film what they have done. This way, for the majority of the tasks the children will not be on the phones apart from if it is to take pictures or film as this fuels creativity along with teaching skills (TheSchoolRun, 2021).

Lastly, I looked for an app that children were able to use to voice their concerns. When searching this I did not find a single app that had a feature like this. The next best thing was a website that you were able to use to report issues. This wasn't too bad as it would work, but the problem that I have is that the children we are targeting are between 8 and 12 years old, and there was so much text on the pages with intimidating words I feel this would put many of the children off. This motivated me to make sure that I have a submission form that gives the children freedom to put whatever they want with no external pressures that could intimidate them into not looking to get help.

3.3 Application Design

When it comes to the designing process there are 3 main software's that I will be looking into. Firstly, will be Balsamiq, this is because it is the only app design software that I have ever used and partially understand how to use it. Next, I will be looking into AdobeXD, as this is a free piece of software (mostly) that seems to be what most designers use. Lastly, I will investigate Figma as this is apparently (Kopf 2019) the best paid products for designing applications.

3.3.1 Balsamiq

Balsamiq was an online web-based design tool that you can access anywhere with an internet connection. This could be very handy as it meant no pre installation or wasted time when going to use the software (cmsiptech 2015). The only concern I have with a web-based program, is the waiting times that you will experience, the more you add to your designs, I have had a problem with this to the point of waiting up to 30 seconds per edit that I made. (Egger 2012)

The one reason I would consider using this product is as I already have experience within this for a previous project that was restricted to using this piece of software. This means that I would not need to spend nearly as much time trying to learn the software as others that can be quite complex with more features than I would ever need.

When it comes to the learning curve of this application, there was little to none with all the basic tools you find in all programs from word to photoshop, the most advanced feature would be linking pages etc. but there is not animation able to be added for example, which pulls away from what the real product would look like in respect to buttons being pressed or screen transitions. If you are looking to make an application design that is anything more than basic, then I feel like the learning curve would be a lot steeper than this as you would have to be creative with the tools given having to attempt to make your own animations by linking pages with different versions of the same images on them etc. but this does not seem worth the time it would take for the clunky product you would end with.

Until early last year Balsamiq was a free product, but now with this being a paid for experience, I doubt I will ever use this software as there are many free products that blow it out of the water in every way.

3.3.2 AdobeXD

AdobeXD is a cloud-based software that will store all the designs on the cloud so that you are able to access them from anywhere. This is perfect as it means that all of the designs that you create will never be left at home or lost from a hard drive corruption etc. (Tarrant 2009)

This software is a standalone application that you will have to have installed on the device you are looking to use it on. This software seems quite incredible when it comes to making a design that is as close to the real product as possible, with the added feature of actually running the design on your own mobile device to see how it would look.

When it comes to the learning curve of this software, even though it is a lot steeper than Balsamiq, the pay-off is definitely worth it. The software also comes with many tutorials that will show you around the software and how each of the tools are used and what they are capable of. If you are IT literate, this software should not take you more than a few hours to learn. Along with this, for me this time went very fast as the software is created in a way that you learn by doing, so you are using the tools to understand them, and this was very enjoyable.

Like most Adobe product, there is a massive community behind this product which means if you ever get stuck on a feature or attempting to make something specific, there is a large chance the answer to your question is already on the internet or you can ask and have an answer within a few hours. This will be a huge help if I decide to use this product as it will mean that any time that I get stuck, there is a good possibility that I will be able to find or acquire a solution within a short period of time and if I get stuck and lack motivation the sense of community around the project I am doing, I feel will really help (Graff 2006).

The one downside to this software is that there is a premium mode that will mean you are not limited on the designs you can make, and you have a few extra features, but from what I am using this software for, this would not be needed and I would be fine with the original free product that they provide.

3.1.3 Figma

Figma a paid product that is seen as one of the best, if not the best on the market. Like AdobeXD this software has a cloud-based storage but is a standalone software that you will need to have installed. Figma also have many tools and means you are capable of making a very good-looking application design within this software, but I am yet to find anything that you can do with this that you are not able to with AdobeXD. This software also has the option to mirror your applications design onto your phone, but this is a little trickier to set up as instead of just getting an app and opening your product like AdobeXD you have to use Figma's mirroring app that also requires syncing with you on a computer. Many everyday computer users would struggle with this, making this product seem to be more for specialises (Ryan 2008).

The learning curve for this is very similar to AdobeXD without as much depth to their tutorials and advice tabs, this made it take a little more to learn overall and also seemed more of a task to learn as I it was a lot of theory to read before understanding and then trying the tools out. If I hadn't had

previous experience within learning a similar software (AdobeXD), I feel this would have been a lot steeper of a learning curve. Coming in as a newcomer I think I would have given up with the tutorials and just attempted to learn on the go.

The community behind this product is a lot smaller than other programs and a lot of the time when looking for answers to specific problems, I got caught up in the Figma website with generic answers which did not help. This made it very difficult to find solutions to my problems. Along with this, if I could not find the solution to my problem and posted for help, many days passed before getting a response meaning it would be better for me to just struggle through and find a solution which is not the best for productivity.

I feel if Figma was a partially free software with limited designs allowed etc. the same as the design Adobe has gone with then I feel this would be a much larger competitor as the community would be larger, and I would be more inclined to buy it when reaching the design cap having invested in the software at that point.

3.2 Application Design Summary

In summary, I feel that if I use Balsamiq I will be making a very basic and unprofessional product that would not be suitable and hit the quality that is expected of me.

When it comes to Figma, this is a software that would be able to create a good quality product and I would be able to use for this product. The issue that I have with this product is that there is not enough community around it and there is not enough difference between this and free products for me to warrant spending money to acquire.

Lastly, we have AdobeXD, this is the product that I will be going with as I will be able to create a high-quality product that will look very similar to the end product, I will develop meaning I will be able to show my client with confidence, what I am going to make them. This product also gives me a high confidence is getting over hurdles with the active community.

3.3 Application Development

3.3.1 “real” Programming

Within Computer science as a whole, it is always seen as best practice to create an app from scratch just using an IDE as you are able to have a blank canvas where anything is possible, and you will not be restricted in the ways that some app creation software will. This is okay, but if you are working on a strict time scale and do not have previous experience is creating apps this way that it can be near impossible to be done by the deadline.

The main programming language used to create apps is java (Morga 2018). When it comes to Java I do not have as much experience as I would like and trying to make an app with my experience would take longer than I have as I would need to learn all the fundamentals of java and then go onto to learn how to turn that into an app.

After some research I have seen that it is possible to create applications using Python (Kivy, 2021), a language that I am a lot more proficient in as a core language but have never investigated how to transfer this into creating an app. Even though the learning curve for this would a little better, overall, the time taken to learn these skills is still over the time in which I must complete my project.

Even though both languages have a huge community and all manner of problems documented, because you are working with a blank canvas there is still a moderate possibility that you can get stuck and not find the solution to your problem. This can make it, so you are stuck on one problem, you can be stuck for days with your application not being able to compile so you are not even able to move on.

3.3.2 Thunkable

Thunkable is an application building software that tries to make it as easy as possible to make the application that you are looking to create with no restriction on functionality or aesthetics. From the test application that I created to try out this software, I have not seen any restrictions and have been able to code everything that I have tried.

Thinkable, coding is a block building system similar to scratch and other products that this is seen as one of the easiest ways to code an application and usually have large limitations when it comes to what you are able to add within the program you are creating but as explained above that this does not seem to be a limitation within this software, it seems like a perfect mix of functionality and ease of use.

The community around thinkable is not very large so getting help if I get stuck could be difficult, but to counteract this I have a few peers that are also using this software for their products and I will be able to get help and advice of them if needed. Even though the community isn't there, with the way that you code within this software it will be very easy to find the mistakes within the code and rectify them meaning overall I will not be wasting much time on trouble shooting.

Thunkable is a fully online software meaning as long as I have an internet connection, I will be able to work on my application, there is not installations required. This is great for me as I like dynamic working and swap between a lot of different machines depending on the situation that day. But this does have the restriction of the more assets that I put on here such as images etc. will slow down the processing majorly, so I would need to make sure that I am keeping the app minimalistic.

Another downside to using Thunkable is that if I want my applications to be private (which is required as this is getting created for a company) I require the pro versions of the software as this feature is locked behind a paywall. This is getting counteracted via the University acquiring licences that I will be able to use.

3.4 Application Development Summary

Firstly, I feel that Thunkable is going to end up being too restrictive for me to be able to make a professional level application, this would be okay to use and an extension to my prototyping is I wanted, but I cannot see it being able to make the whole application with the creative freedom that I am going to need to include all the different features that they are looking for.

Next, we have Java, If I had more time then Java then this would be the perfect route as not just is it what the majority of people use for applications, but It would be the perfect platform for me to start to learn another language that I am very interested in. Unfortunately, due to the time restrictions, I do not feel I would be able to make an application of the quality that the client is wanting if I did this, if a functional application at all.

This determines that I am going to be using Python to create my application, with more research into Kivy (The module within python), all of the logic that you need to create the app will be done with normal python code, meaning the logical part of the app I am very confident with. Now we have to look at the aesthetical part of the app. Kivy seems to do styling in a similar way to CSS by having style sheets, as I already know and have done many CSS style sheets, this gives me the confidence what even on the time restriction that I have, I will be able to get the project complete.

3.6 Security

In respect to security there are 2 different sectors that I will priorities and in may ways they will link. The first will be the children security within the application, keeping them safe from people outside of the choir group trying to get on the app, making sure they are not getting bullied on the app, and giving them a safe space to tell us if there are problems such as abuse in at home. Then we have the database security that is I will need to keep all the data stores safe, make sure there is no way for users to inject database statements to get private information, and in a safe server location that will abide by the highest security standard possible.

3.6.1 The children

As the article from Christine (Christine Elgersma, 2017) explains, there is a big problem with adult predators trying to get onto platforms that are primarily for children so that they can groom children. With my app I am looking to eradicate this from the get-go, I will be doing this by having a closed system that only users personally given a login will be able to access it. This means that the only way a predator would be able to get into the system is if they were able to get one of these cards. To prevent the theft of a card, when they are given out, we will be looking to get the email of the parent of the child given the card, this will then be linked to the user and the user will not be activated until the parent has confirmed the activation within their emails. After a lot of thought this seems to be a suitable approach to make sure that only performers are on the app.

For the security of the children within the app, there will be 2 staff members dedicated to monitoring for anything that could be seen as inappropriate or bullying. If this is seen on the app, it will be instantly removed, the user will get a temporary ban with a 3 point system where if they get a third ban, they are then permanently banned, and then the school that the user comes from would then be notified that they are actively cyber bullying and they should keep an eye out to make sure this is not happening in real life also. Along with this, I will be creating a profanity filter that will detect if any users are swearing in a submission and if they are, the submission will error out until they fix all the language.

Lastly, we have the home security with the app. Since covid the number of children being abused in their home has gone up significantly, where the amount of child support has gone down due to isolation (Eleni Romanou, 2020). This is the reason I will be adding to the app a safe place where the children will be able to express any concerns that they have. Then if there is any abuse reported within this section, it will then have to be pasted on the school the user is in, to them be spoken about in a discrete manner to see if it needs to go further to authorities or not. It will not be possible for Beyond Words to go straight to the authorities as we are trying to take as little information as possible from the children, so we will know their schools but not their addresses. But both I and Beyond Words feel this is a better way to tackle the issue as the child will be able to use the school as a safe space to explain the situation more, before it gets escalated to their homes.

3.7 The Database

When looking at database there was 2 main aspects, knowledge, and security. After looking at some of the most popular databases (Cody Arsenault, 2017). I then investigated a few that sounded good seeing what security measure they had. After this research I have decided that I will feel the most comfortable using MySQL as I already have some experience with it, and it has many security features (MySQL, 2021) such as authentication, password validation and firewalls that I will look into using to keep all of the information as secure as possible, As the majority of the information that will be stored is not of much use and all of the security that will be here, there will be no value in this for a hacker as it would cost more in time than they would get out of it.

SQL injection can be a very big problem in some websites and applications and will need to be something that I keep in mind and make sure that I prevent as with this method, users could potentially manipulate the whole database in whatever way they would like, from changing comments or pictures to deleting the whole database so nobody has access to it. To prevent this I will be referencing the SQL prevention cheat sheet (OWASP, 2021) putting in as many prevention methods possible. As long as I follow this and do not rush or get lazy, the whole app will be secure from this kind of attack. From the developer side of application creation, this is the main attack that will be attempted, as it is the only one worth users time with others taking too long to not be worth the time. I will still protect from them but this will be my primary focus as it has the highest possibility of happening after cloud configuration errors (bcs, 2019).

Lastly, we have the location of the server, this will matter as the laws in different countries say that the information within the server could be monitored (Wow Digital, 2020). So we will need to find a server that is a mix of three crucial points, secure privacy, fast, and not too expensive. If it isn't too much, I would be looking to get a server within the UK as we have good privacy laws and as it is close, the speed would be fast enough. If this is not feasible on the price, I would then start looking in other European countries to keep the speed, but double check that the company that I go with Abides by all the privacy the UK does to keep it secure.

4. Approach

My approach for this project had 5 main stages to it, Initial Plan, Research, Design, Development, Final Product. The initial plan is for me to figure out the scope of the project and a full understanding of what is wanted of me. Research is where I will be researching all the different aspects that will assist me in making the product wanted by the clients. Design is where I will create an app design that will be able to show me and the client what the app will look and work like. Development is where I will be creating the prototype application for the client. Lastly, Final Product is where I will show the client the prototype with the little changes asked from the development stage and I will also do the last bit of write up on how the project as a whole went and how I feel I did.

4.1 Initial Plan

The initial plan will start with me having a meeting with the client where they will be able to write notes to confirm everything that they are looking for in the app that they want. After this, I will then be going through the notes and the project description to get a full understanding of what I need to do. I will then start to come up with a list of aims, objectives and constraints. Next, I will write a time plan that will keep me on track for what I should have done by what time. As this project is rather

large for the time that I have, I will need to make sure that I am keeping up with the time plan that I have kept as otherwise it will get out of hand and I will not be able to get everything complete.

4.2 Research

For the research, I will be making a list of all of the different aspects that I can think of that will impact my results within this project, but you don't know what you don't know and for this reason I am going to be leaving myself time to make sure that I can go down research rabbit holes if I come across any topics that seem important which I have not thought of yet.

I will also be having a meeting with a professional within the childcare industry, to see if there are any key issues or features that will keep my target demographic using the application that I should investigate. This will be very important as the last time I spoke to a friend about this I was told about the impact in design features such as normal or unique shapes and how children will not understand how to use the application if you have a mix of both.

I will be looking to do my secondary research first and then go onto my primary sources of research as I will be more informed by this point and will be able to ask them more questions that otherwise I would not think of. Along with the information I get from this helping the development of the app, this will also be a way that I can test my secondary research making sure that it is accurate, and I have not got the wrong end of the stick.

4.3 Design

There will be 3 different stages to the design process, Initial Design, Revision, Final and between each stage there will be a meeting with my client to make sure that they like what they see and have their input on how it looks.

The initial design is where I take all the information and knowledge that I have acquired up until this point and then I create a design that I feel hits all the points that are in the requirements and hits all of the points that I have researched into. After this, I will then have a meeting with the client where I will be asking them and noting down different features that they like, dislike, want kept and want changed.

In the revision stage, I will not go back over the designs adding in all the features that the client wants, taking away anything that was not liked and making the designs work with the new changes. After this there will be another meeting where the client has their last chance to tell me their thoughts again.

The final stage is where I again make all the changes that the client wants to see, but after this there will not be any more development on the app design. I will then have the last meeting with the client on the topic of the app design just to show them everything that I have done to make sure that they agree with the design.

4.4 Development

The development stage is going to be a large chunk of time that is dedicated specifically to creating the prototype, I will be splitting this up into 2 separate parts, Learning and executing.

Even though I know a lot about python and how to program within the language, I have never used the module called Kivy, which is the way in which you create an app through python. The learning stage will be fully dedicated to me learning how to use this module. There are a few different ways

for me to do this, I will be starting with tutorials (Tim, 2019) to get all of the basics down, then go on to make a simple app with some unique features that I know I am going to need when creating the real prototype. When I inevitably get stuck within this process I will be using the Kivy documentation (Kivy, 2018) to find the solution.

After I am confident with the Kivy module in python, I will now be going onto making the prototype from the designs that I previously created. As I now know the language and the module, this will be okay but as the application is rather large, this will still need a lot of time to create and there will still be aspects of Kivy that I have never used before and will need to look up. I will be looking to dedicate about 2/3 of all the development time that I have to the creation of this prototype as this should mean I have time for the coding and the times when I need to research how to add certain features.

4.5 Final Product

After the prototype is created, I will be moving the final product stage. This stage will start by me having a meeting with my client, showing what I have created, how it works, and sending the apps code over to them for if they would like to hire someone to finish it off. Within this meeting I will get feedback from the client asking the main aspects they liked, what they think I could have done better and other ways they think I could develop.

I will then be finishing off all of the documentation around this project as it is complete such as testing the prototype with test cases, seeing how the prototype compares to the acceptance criteria given, explaining all of the different ways in which I swayed from the original design and the reasons why, then reflecting on the project as whole to see what I did well, what I could have done better and what I would change if I was to do this again.

Finally, when all of this is complete, I will then go through my application making a list of how to navigate through the application to show off all the different features that it has for when it comes to the Viva as I want to make sure that I do not miss anything out. When my list is complete, I will then have some friends help me do a test Viva where I will be able to practice for the real thing.

5. Implementation

5.1 Design's

5.1.1 Functional Requirements

ID	Functional Requirement	Must, Should, Could, Won't
1	Users are able to open up the app to the login screen	Must
2	Users are able to log in with the Login details they are provided	Must
3	Users are able to change their login details from the provided ones	Must
4	Users are able to open the news tab	Must

5	Users are able to see news from the other users on the platform	Must
6	Users are able to upload their own news	Must
7	Users are able to go from any pages back to the main menu	Must
8	Users are able to open up the comedy page	Must
9	Users are able to view other users jokes	Must
10	Users are able to upload their own jokes	Must
11	Users are able to open the FOEO page	Must
12	Users are able to upload their concerns or feedback and this can only be seen by Beyond Words Staff Members	Must
13	Users are able to get to the competition page	Must
14	Users are able to view all of the competitions uploaded by the staff members	Must
15	Users are able to upload their competition entries	Must
16	Users are able to go to the challenges page	Must
17	Users are able to view all of the challenges that the staff members have uploaded	Must
18	Users are able to upload their challenge entries	Must
19	Users are able to open the music tab	Must
20	Users are able to play music uploaded by other users	Must
21	Users can upload their own Music	Must
22	Users get logged out when the app is closed	Must
23	Users are able to draw their news, jokes or FOEO entries	Could

24	Users are able to direct message their friends	Could
25	Staff are able to upload content and monitor content though the app	Could
26	Staff have an admin account to view content	Should
27	Users are able to change their personal details at anytime	Should
28	Users are able to request/suggest challenges, competitions	Should
29	Staff members have to verify content before it is uploaded for all to see	Could
30	Users can see what users have uploaded what	Could
31	Users uploads automatically update onto app	Should
32	Users are able to delete their account if wanted	Should
33	Staff are able to restrict Accounts	Could
34	Staff are able to disable accounts.	Should
35	Staff are able to delete dormant accounts	Could

Table 1 Requirements Table

5.1.2 Acceptance Criteria

This is the acceptance Criteria that has been created with my client as a level of functionality for the application.

Acceptance Criteria	Completed?	Description
The app is a private closed loop.	Yes	The application is a closed loop as the only way users can access more than the login page is with provided credentials that will not be given to anyone outside of the group.
The app has a login and register page.	Yes	The app has both a login and register page, though the register page is only on initial sign in and you are not able to change your credentials after this.

The app has somewhere users are able to see other's news and upload their own.	Yes	The app has the news tab as shown further up, this page has all of the users news, then if the user pressed the plus button, they are then able to add their own news.
The app has somewhere users can see other's jokes and write their own.	Yes	The app has the news tab and shown in the prototype section above, joke can be read here and you can again press the plus button to upload your own joke.
The app has somewhere users are able to reach out and give feedback	Yes	The app has its own For Our Eyes Only page with the sole purpose of having the users both give feedback and reach out if they want to tell us anything.
The app has somewhere users are able to enter competitions	Yes	The app has more than just the competition page but also the challenges page as the client later requested. Both of these pages have a page for reading the tasks or projects and then an upload space.
The app has somewhere users can listen to music from others and upload their own.	Yes	The app has a music tab where users are able to click on the music title for the music to play, and can then click the plus button if they want to upload their own music.
The app can be navigated with ease.	Yes	For lack of a test group I gave the app to my niece and 2 nephew's ages between 4 – 10 and they were all able to use the application with ease.

Table 2 Requirements Acceptance Criteria

5.1.3 Use-Case

The users of the system will be given a card that shows the details that they will need for a default account that they will be able to sign into and then modify making it personal to them.

Register to the system using credentials provided	
1.	Users' login with the credentials given
2.	Users are able to personalise their account from default
3.	Users are able to log into their account with the new credentials they have added.
4.	

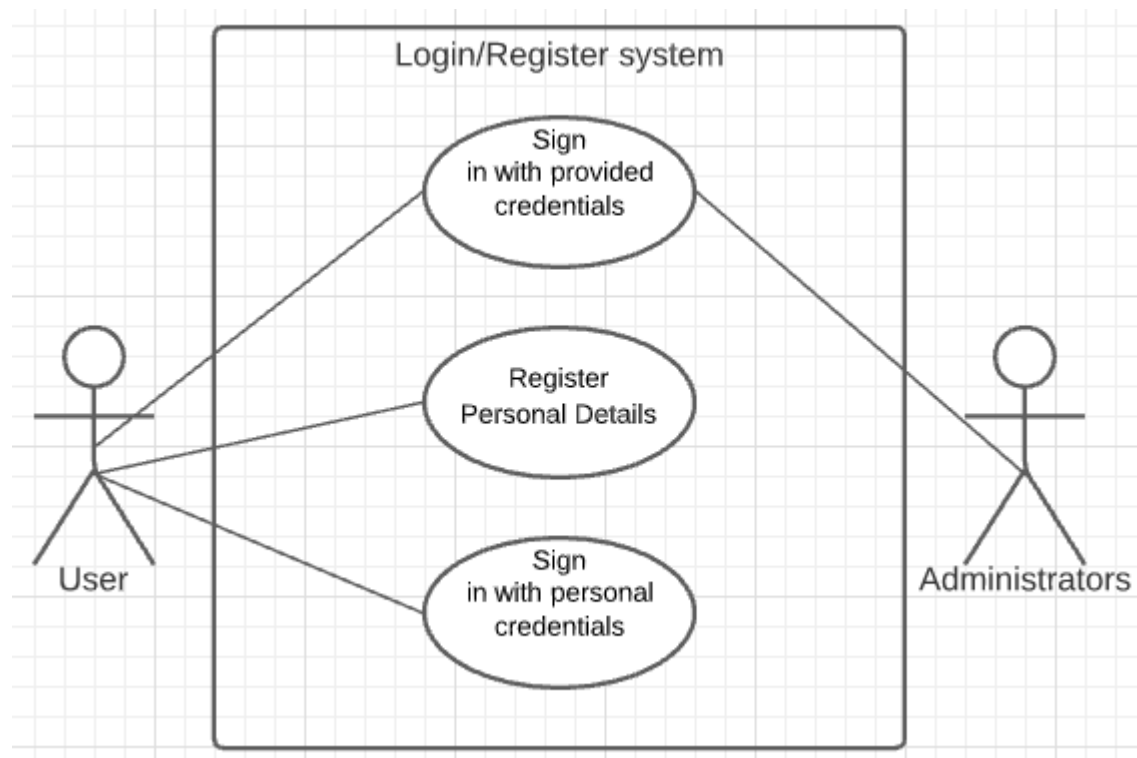


Figure 1 Use Case for Login/Register

Use Case Number	UC1
User Case Name	Login/Register System
Description	The user can access the application with the provided information, personalise their data and then log in with personal credentials.
Precondition(s)	The users know the provided initial credentials and has the application installed
Basic Flow	<ol style="list-style-type: none"> 1. Opens application. 2. Enters provided username and password. 3. Enters personal information. 4. Restart's application 5. Enters personal credentials.
Alternative flow	<ol style="list-style-type: none"> 1. Opens application. 2. Enters provided credentials wrong. 3. Access denied.
Basic Flow STN	<pre> graph LR Start([Opens application.]) --> Step1[Enters provided username and password.] Step1 --> Decision{Checks credentials.} Decision -- "Correct credentials" --> Step2[Enters personal information.] Step2 --> Step3[Restart's application.] Step3 --> Step4[Enters personal credentials.] Decision -- "Wrong credentials" --> Step5[Clear username and password.] Step5 --> Step1 </pre>

Users will be able to view all of the content within the application from the content other users have uploaded to the content that the staff members upload, for challenged and competitions.

Users view content

1.	Users have access to the News from other Users
2.	Users have access to the Competition Page with the challenges upload from staff members
3.	Users have access to the jokes users and staff members have uploaded.
4.	Users are able to access the music page and listen to the music that users have uploaded

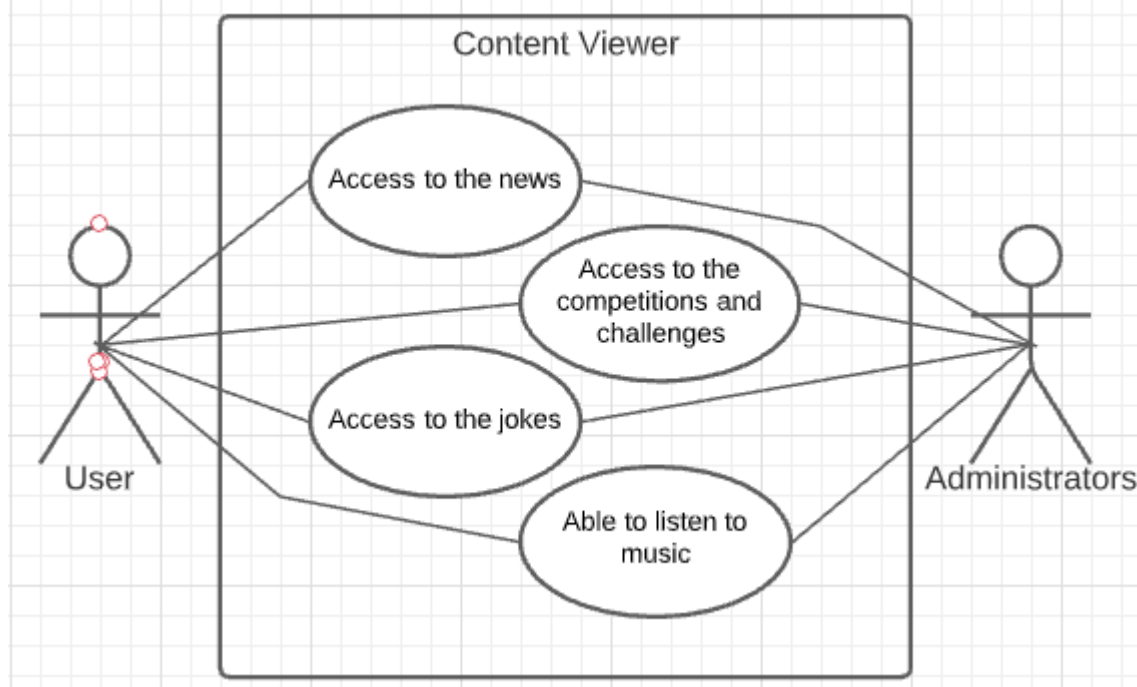
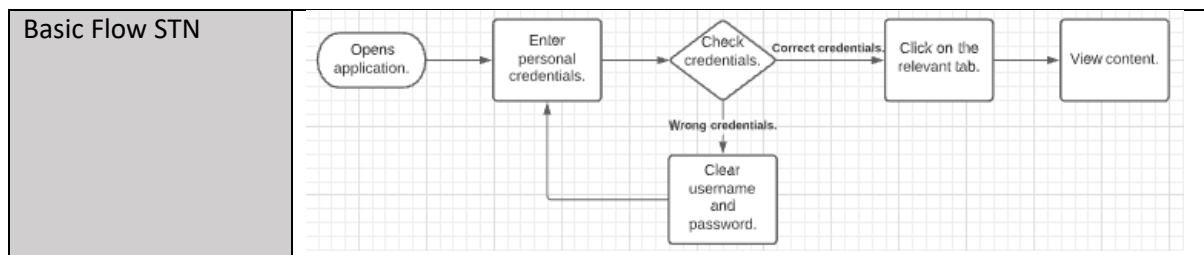


Figure 2 Use Case for Content Viewer

Use Case Number	UC2
User Case Name	Content Viewer
Description	The users are able to click on the relevant tabs and view content that have been uploaded
Precondition(s)	The users will need the application installed and have registered.
Basic Flow	<ol style="list-style-type: none"> 1. Open application 2. Enter personal credentials. 3. Click on the relevant tab (News, Comedy, Competition, Challenges) 4. View content
Alternative flow	<ol style="list-style-type: none"> 1. Opens application. 2. Enter Personal Credentials 3. Click on "Music" tab 4. View content. 5. Click content. 6. Plays music.



Staff members need to be able to moderate the application from creating, deleting and modifying content, to banning/restricting accounts to make sure that we are keeping a healthy environment.

Staff Moderating	
1.	Staff are able to delete user from the system.
2.	Staff are able to create content
3.	Staff are able to modify content
4.	Staff are about to delete content

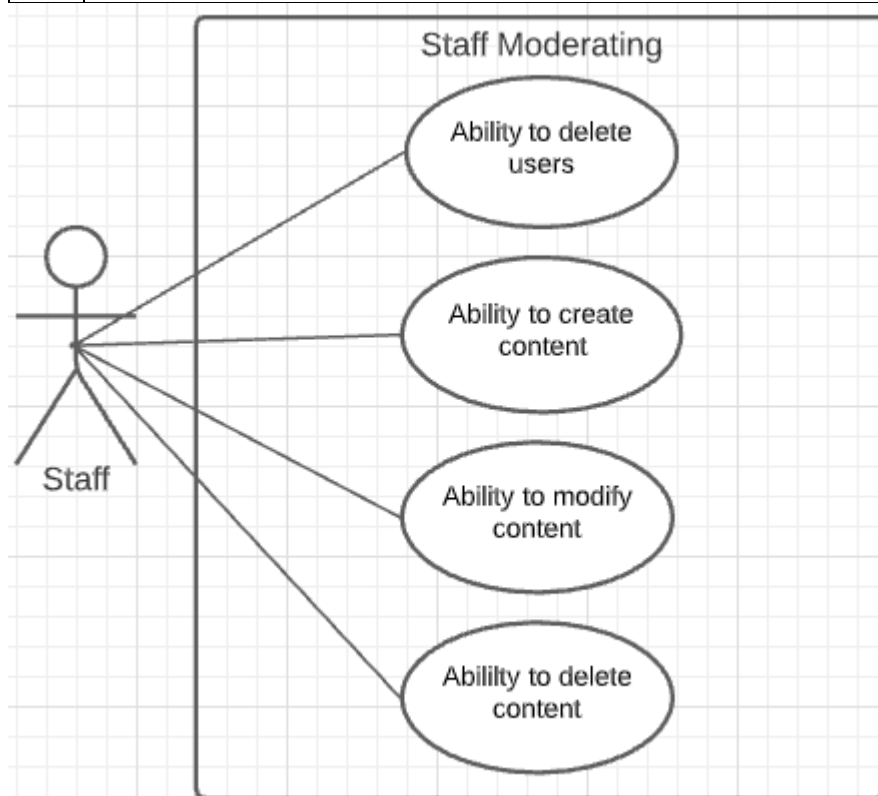



Figure 3 Use Case for Staff Moderating

Use Case Number	UC3
User Case Name	Staff Moderating
Description	The staff are able to manipulate the content within the application how they see fit.
Precondition(s)	The staff member will need access to the database and a basic understanding on how to use a database
Basic Flow	<ol style="list-style-type: none"> 1. Open Database. 2. Click to relevant table.

	<ol style="list-style-type: none"> 3. Click to add new row. 4. Fill in details for new row. 5. Save.
Alternative flow	<ol style="list-style-type: none"> 1. Open Database. 2. Click to relevant table. 3. Click on relevant row. 4. Click delete/modify row. 5. Change data/confirm deletion. 6. Save.
Basic Flow STN	 <pre> graph LR A([Open data base.]) --> B[Click relevant table.] B --> C[Click to add new row.] C --> D[Fill in details for new row.] D --> E[Save.] </pre>

Users are able to upload content for competition and challenge submissions, to share their jokes, share their news, share their music, and share their thoughts with the Beyond Words Members.

User uploads	
1.	Users can upload their news for all users to see.
2.	Users can upload their thoughts for staff members only to see
3.	Users are able to upload their jokes for all users to read
4.	Users can upload their music for all users to listen to.
5.	Users can upload challenge and competition submissions.

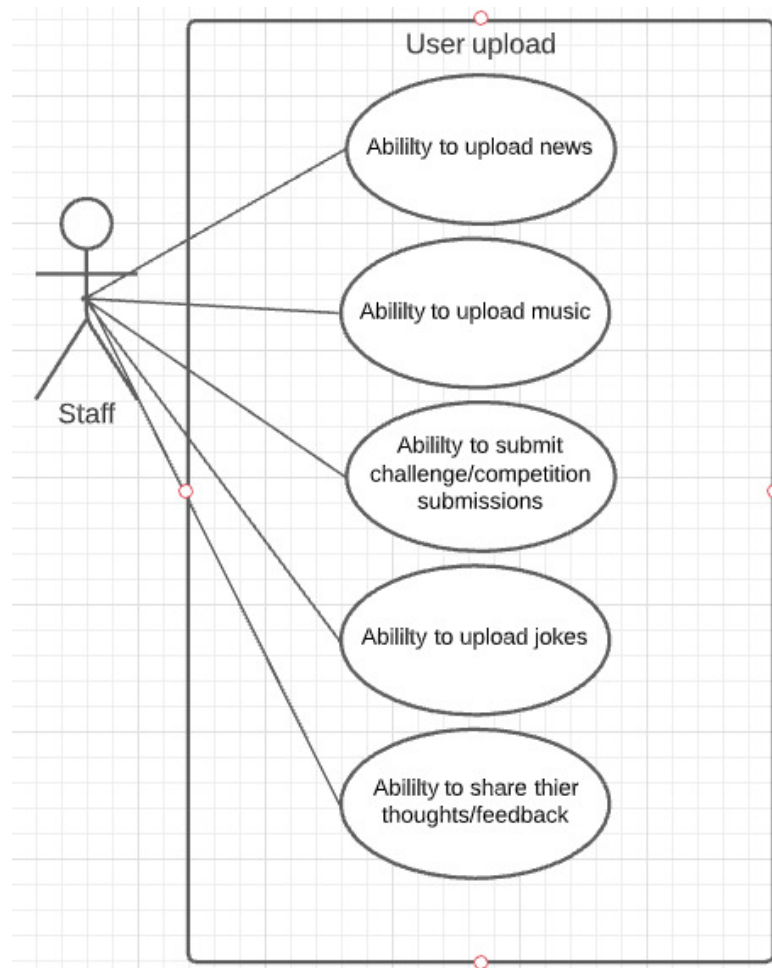


Figure 4 Use Case for User Upload

Use Case Number	UC4
User Case Name	User Upload
Description	The users will be able to upload content or submissions through the application.
Precondition(s)	The users will need the application installed, need to be registered and have something to upload.
Basic Flow	<ol style="list-style-type: none"> 1. Open application. 2. Login. 3. Click on relevant tab (News, Jokes, Competition, Challenges, Music). 4. Click on the add button. 5. Enter upload/submission information. 6. Click upload
Alternative flow	<ol style="list-style-type: none"> 1. Open application. 2. Login. 3. Click on FOEO tab. 4. Enter thoughts/feedback. 5. Click upload.
Basic Flow STN	<pre> graph LR A([Open application.]) --> B[Login] B --> C[Click on relevant tab.] C --> D[Click on the add button.] D --> E[Enter upload/submission information.] E --> F[Click upload.] </pre>

5.1.4 Use Case Analysis

ID	Title	Use Case ID	Description	Quality	Benefits
A	Login/Register	A1	Users Login with provided credentials	need to ensure all users only use their own logins and do not give them away	nobody without a provided username password cannot enter the site
		A2	users are able to personalise their accounts from default	users need to be able to change username and password for if anybody else found the provided ones	users are able to customise their account.
		A3	users are able to log into their accounts with the new credentials they have added	needed to ensure no user has easy to crack credentials but still has access to the app.	users will be able to memorise their username and passwords that are familiar to them and not need them written down.
B	View content	B1	Users have access to the News from other Users	needed so users can stay in contact with others from their shows	users will be able to read other users news
		B2	Users have access to the Competition Page with the challenges upload from staff members	needed to keep uses interacting with the system	users will be able to see what competitions and challenges they may want to participate in
		B3	Users have access to the jokes users and staff members have uploaded.	needed to let the children express creative skills	users will be able to read an enjoy jokes from other users
		B4	Users are able to access the music page and listen to the music that users have uploaded	needed for users to show musical skill outside of school	users will be able to listen and enjoy music uploaded by other peers
C	Staff Moderation	C1	Staff are able to delete user from the system.	needed to ensure hey safe place for all of the other users on the application	staff will be able to keep the system as safe as possible

		C2	Staff are able to create content	needed to make sure knew competitions and challenges are uploaded to keep users interacting	staff will be able to add fun contests
		C3	Staff are able to modify content	needed to make sure any clarification within competitions or challenges can be added along with can be used to censor other content	staff will be able to censor and correct information when needed
D	User Uploads	D1	Users can upload their news for all users to see.	needed to ensure uses have access to upload news and keep the page updated	users can express their own news in a safe place
		D2	Users can upload their thoughts for staff members only to see	this is needed to ensure all users have a safe place where they can say anything needed to staff members	users you'll have a safe place to go to get help if needed and can give feedback on shows for Beyond Words to improve next year
		D3	Users are able to upload their jokes for all users to read	this is needed to enable users to upload their own jokes and keep the comedy page relevant	users will be able to show their comedy talent within a safe space
		D4	Users can upload their music for all users to listen to.	this is needed for users to be able to upload their own music keeping the music page relevant	users will be able to show their musical talent within a safe space
		D5	Users can upload challenge and competition submissions.	this is needed for the users to submit that challenge and competition submissions for when there are prizes to be won	he says he'll be able to show that progress through the different tasks and mini projects.

Table 3 Use Case Benefits Analysis

5.1.5 Sequence Diagram



Figure 5 Sequence Diagram for Entire System

This is a sequence diagram of a user going from provided credentials, to using every part of the system. The prerequisites for this are the provided credentials, a piece of news you would like to share, a joke, some feedback for the company, a piece of music, a competition submission, and a challenge submission.

5.1.6 Class Diagram

Class diagram with UML notation

griffithsd26 | May 22, 2021

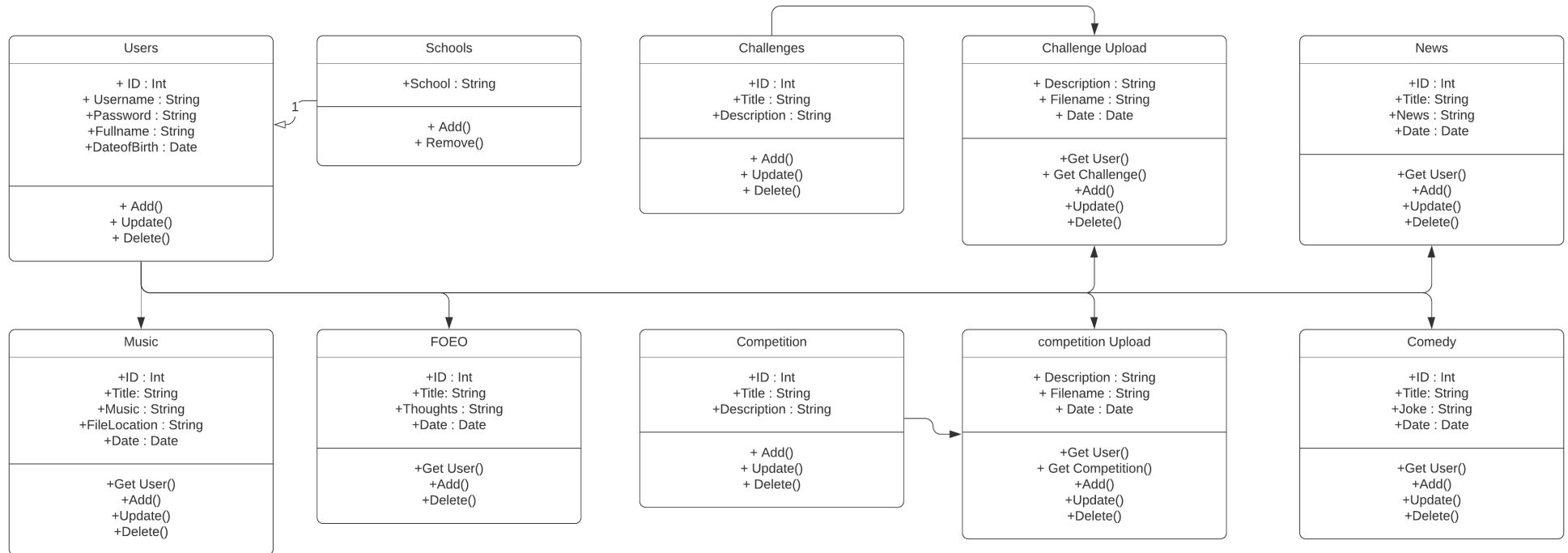


Figure 6 Simplified Class Diagram for Entire System

This is the class diagram showing all of the different information that the classes would be holding along with how that information would be manipulated using different functions such as requesting data from other classes.

5.2 Development Process

Within the development process, there were 2 main obvious partitions that I stuck to, Database creation and the coding platform. After the initial set up and plan that I followed, I left everything flexible for if there was anything forgotten, anything that needed changing to be compatible etc.

5.2.1 Database Creation

For the database, as this is a proof-of-concept application, I stuck to using SQLite where in reality this app in full deployment would use SQL. The reason for this was, when you are looking to user a SQL database even locally, you need to make a local server and then run it in the background, then connect to it and run the application. Whereas with SQLite, it is already linked with python, there is no extra steps to have it running, it just runs when your application runs.

To begin the database, I created a python file that would create a database, all the tables and all of the columns as this way if I even broke the database or different entries, I could simply delete the test database and create another.

When the database was creating, I then looped creating a random user 3000 times to create enough accounts that everyone user from Beyond Words choir would have an account.

As the application pulls from the database, to test the application I needed to have some entries in each of the fields to that I could see if it worked properly. To make this easier than me manually typing in all of the entries, instead I added to this file a few inserts for all of the different tables that I was looking to test. This saved time overall as it meant I didn't have to manually add in around 100 entries.

5.2.2 Programming

For programming in python using Kivy, I knew I needed to have a .kv file for all of the styles and then the usual python file for all of the logic that would go behind the page. Because of this, I knew without at least a basic styles page, I would not be able to do the python page as I would not be able to see my results. For this reason, I started by creating a basic style page that included all the page background, titles, and the buttons, I thought I would need to get started. This was a lot more difficult than I thought it would be as I am used to working on one item at a time and here it was more like I was working on all the different pages simultaneously, but after getting comfortable with this it ended up being the better way to work helping a lot with my time efficiency. A big oversight on my side was that I forgot to add anyway to go back to the main menu from any of the pages, meaning after you went into a specific page from the main menu, you were locked into that page until you reset. I only noticed with after trying to test 2 pages of logic without closing the application. As I didn't know how I wanted to add the back button into the application at this time, I didn't end up adding one until quite late and instead I had it so you have to go through the full path you went down to get back to the main menu (not just view the news but also upload news). When it comes to testing, this actually really helped as even though at the times it could get annoying, each page's upload form had very rigorous testing as I had to do it with every test. This is defiantly something I would look to do again to make sure that I am not lazy have to passively test as I go. This also meant that if I ever broke anything unexpected, I found it a lot faster than usual as the whole app was being used all the time.

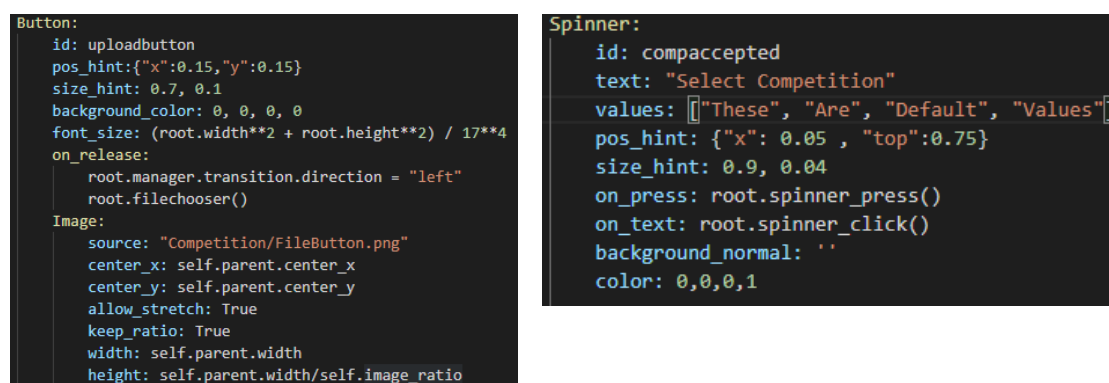
After the basic style was done, I then went on to do all of the logic to the application, I started from the first page of the app (home screen), then register, then main menu as these were all unique

pages and then went on to group the different pages together as they all needed a lot of the same functions and if I was going back and fourth between the different pages then I would have had to keep recapping on my other code to make sure I understood it all properly. In respect to grouping, I grouped, news, comedy, and then went onto the music tab that needed a mixture of unique functions and the other pages. I then grouped all the upload pages together for all the pages, as uploads for children can already be difficult, I needed to make sure all of these pages were as similar as possible so after they had mastered one, they would be able to use all of them. I then finished by grouping the competition and challenges pages with reference to the first group but with modification.

After I had the logic of the application down, I then had time to come back to the aesthetics. My main target here was to make the application look as close to the design prototypes as possible. This worked well but I had some colour changes as some of the text within the pages was very difficult to read so little changes to make everything readable and match in with not too high contrasts between the different colours. This part took longer than expected as there were many little bits of details that I hadn't thought of before and is only noticed when you are going through the whole application with a fine-tooth comb. This is also the stage where I made the decision on that back button being the users just clicking on the title of the page that they are on, and this seemed to work well, not cluttering up the page or too confusing that it would not be found as many websites and apps do this.

As I was flexible between all the different development processes, when I found bits of logic that didn't feel quite as smooth as I wanted within the final details, I had time to go back and change them and come up with a more user-friendly approach. A great example of this would be the music page, when the users first pressed to play a song that another had uploaded, they were then stuck on a frozen page when they listen to the music. I didn't really like this so in my spare time I changed this to a different sound module that would play the music in the background as you continue to surf the application.

Here are some snippets of the .kv file, as explained earlier, this is very similar to the way CSS works. The first image is a button which has an image behind it and the function that it will call on the release of the button being clicked. The second image is of the "Spinner" which is how you create a dropdown menu within Kivy, The values within this section are actually pulled from the database meaning the default values will never be seen unless there is a problem with the connection.



```

Button:
    id: uploadbutton
    pos_hint:{"x":0.15,"y":0.15}
    size_hint: 0.7, 0.1
    background_color: 0, 0, 0, 0
    font_size: (root.width**2 + root.height**2) / 17**4
    on_release:
        root.manager.transition.direction = "left"
        root.filechooser()
    Image:
        source: "Competition/FileButton.png"
        center_x: self.parent.center_x
        center_y: self.parent.center_y
        allow_stretch: True
        keep_ratio: True
        width: self.parent.width
        height: self.parent.width/self.image_ratio

Spinner:
    id: compaccepted
    text: "Select Competition"
    values: ["These", "Are", "Default", "Values"]
    pos_hint: {"x": 0.05, "top":0.75}
    size_hint: 0.9, 0.04
    on_press: root.spinner_press()
    on_text: root.spinner_click()
    background_normal: ''
    color: 0,0,0,1
  
```

Figure 7 Kivy Code Example

Here are some snippets of the python file, in my case this is the logic behind the application, this file worries about all of the different processes that are needed to update the database etc but also used as a middleman to have all of the database items talk to the Kivy file for things such as verifying credentials or adding and showing users joke submissions. The first snippet you see is showing the database saving a user's registered credentials and the second is showing the users jokes being loaded into the application.

```
def CheckRegister(self):
    global OriginalUser
    User = self.newusername.text
    Pass = self.newpassword.text
    ConfPass = self.confirmpassword.text
    SchoolName = self.schoolname.text
    (variable) Name: Any text
    Name = self.fullname.text

    RegCheck = 0

    if Name != "":
        RegCheck += 1
    else:
        self.ClearBox(1, "Please Enter Name", self.fullname, 1)
        RegCheck = 0

    try:
        datetime.datetime.strptime(DOB, "%d/%m/%Y")
        RegCheck += 1
    except ValueError:
        self.ClearBox(1, "Invalid Date", self.dateofbirth, 1)
        RegCheck = 0

    if User != "":
        c.execute("SELECT * FROM LoginDetails WHERE UserName='" + User + "'")
        data = c.fetchall()
        if data == []:
            RegCheck += 1
        else:
            self.ClearBox(1, "Username Taken", self.newusername, 1)
            RegCheck = 0
    else:
        self.ClearBox(1, "Please Enter Username", self.newusername, 1)
        RegCheck = 0

    if Pass == ConfPass and Pass != "":
        RegCheck += 1
    else:
        self.ClearBox(1, "Passwords Didn't Match", [self.newpassword, self.confirmpassword], 2)
        RegCheck = 0

    if SchoolName != "Choose School":
        RegCheck += 1
    else:
        self.ClearBox(1, "Please Pick School", self.schoolname, 3)
        RegCheck = 0

    if RegCheck == 5:
        c.execute("UPDATE LoginDetails SET UserName = '" + User + "', Password = '" + Pass + "', Fullname = '" + Name + "', DateofBirth = '" + DOB + "', School = '" + SchoolName + "' WHERE UserName = '" + OriginalUser + "'")
        connection.commit()

        OriginalUser = User

    sm.current = "MainMenuPage"
```

```
class ComedyWindow(Screen):
    container = ObjectProperty(None)

    def __init__(self, **kwargs):
        super(ComedyWindow, self).__init__(**kwargs)
        Clock.schedule_once(self.setup_scrollview, 1)

    def setup_scrollview(self, dt):
        self.container.bind(minimum_height=self.container.setter('height'))
        self.add_text_inputs()

    def add_text_inputs(self):
        c.execute("SELECT Joke FROM Comedy")
        data = c.fetchall()

        for items in data:
            string = items[0].replace("\n", "")
            string = textwrap.fill(string, 30)
            buttoninput = Button(
                text=string,
                color = (1,1,1,1),
                background_normal = "NewsPage/ClearMessage.png",
                size_hint_y= None,
                height=140)
            self.container.add_widget(buttoninput)
```

Figure 8 Python Code Example

6 Evaluation

6.1 Testing

There are 4 main ways that I will be looking to test this app, 3 of the testing methods I will be able to do within the time frame of this project and there will be one that will have to be added within the future, but I feel would be too important to skip over.

6.1.1 Test Cases

As soon as I have the app at a functional level, where I feel confident that all of the features that I would like to add are included I will be looking to create test cases. Within these test cases I will be going over the app page by page testing as many different variants of the way in which that page could be interacted with. This will help me be able to find any bugs that will need ironing out and will mean that overall, I will have a robust system that will not break, leaving children with a negative attitude to the app.

After all the initial test cases are worked out, I will then be looking to start work on more of the aesthetics of the application making sure it is pleasing to the eye, while doing this there is a chance of the app being broken from the changes in the code. To prevent this, after all of the aesthetics are complete, I will go over the test cases that I have created once more adding a new column for these tests, and make sure that everything is still smooth.

6.1.2 Customer Satisfaction

Even with a functional app there are many more parameters that assure the success of an app, such as the ease of use, navigation, and overall understanding on how the app works. To test these, I will be looking to get a group similar to my target demographic, and have them use the app with one another for a few days. After the few days have past, I would then ask them for 3 lists, a list of things that need changing, a list of things they like, and a list of things they would like to see.

After this, I will then revise the app based on the feedback given and repeat this test. The main reason for the repeat will be that some of the features that I have added could be clunky or just not fit with the program, but mainly to see if the aspects that the children wanted changed have had a positive impact as many times people do not know what they want and don't want until they see both of the options first-hand.

6.1.3 Client Satisfaction

After the 2 forms of testing above, I would then look to go to the client and see how they feel about the final product, I would discuss the demographics feedback and other challenges or extensions from the original brief. The client would then be able to give me feedback in it they like the app if some of the app has gone in the wrong direction or other worries they may have. At the end of the meeting, I would then leave them with the same 3 lists as the children from the last section, so that they are able to have a good think about the app and make sure I know all their thoughts.

A few days later when all the feedback is in and I have had time to develop the system in the way they like, I would then have another meeting to showcase all of the changes to make sure that their vision and mine aligned. As long as they are happy with everything, then it will be kept, otherwise I will be able to go back to a previous revision of the application.

It is key to note that if there are any decisions that the client makes that are going directly against what the demographic of this product said, then I would look to challenge the client on this decision discussing how it was either a feature that the demographic definitely wanted kept in or it was an idea originally suggested by our target demographic, as my client is not my target demographic I feel it would be more worth while for the application to stick with the features that real users seem to like the most.

6.1.4 Concurrent Users

After this application is launched and live for Performers of Beyond Words, I would be looking to wait around 3 months and then see if the concurrent users count is still close to the original number of users signing up for this app. If this is the case, then we will know that the application as a whole has been a success and is being enjoyed by all and is a great way for them to stay connected.

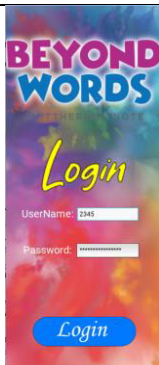
However, if this app has a lower user count than expected we would look into investigating why the users have stopped using the app and see how this could be fixed. We are able to do our best to predict that this won't happen, but there is still a small chance that it will. If this does happen, we would look into all of the children's feedback on why they have stopped using the app, improve the app so that the user's longevity is more sustainable before then looking into doing a new marketing campaign for the app at all of the Beyond Words events to make sure that all of the users know that the app have been updated and is better than ever.


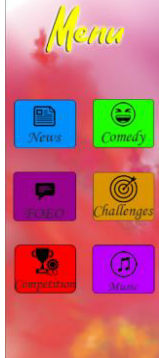
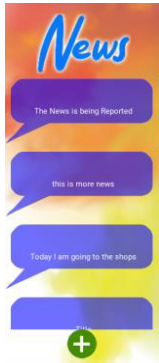
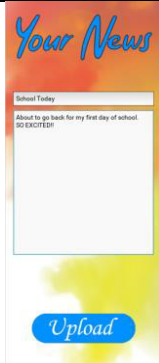
This test would not be within the time scale of this project, but for whoever works on this proof of concept to really get it out into the world, I feel that this is one of the best ways of measuring success as having an app with no users no matter how great the app is, would be a failure.

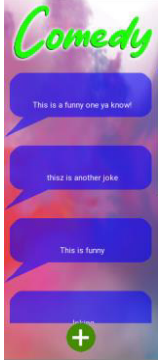


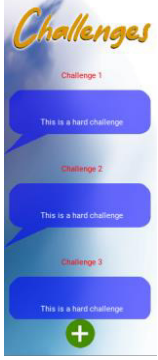

6.2 Final Project

6.2.1 Prototypes

This is my evaluation of the application as a whole, here I explain how all of the different pages work and what their function is.

ID	Page	Preview	Description
1	Home		This is the first screen that any user will see when they open up the application, if this is their first time on the app then they will need to enter in the provided credentials and otherwise they would be looking to enter they credentials that they have set up to log in and gain access to the system.

2	Register		This is the Register page, this is the page you will come to after entering your provided credentials, here is where the users will be personalising the account to them and really making it theirs.
3	Main Menu		This is the main menu which is the hub of all navigation around the application and gives the user access to all the other pages that they may want to look at by a simple click on the tabs provided.
4	News		This is the news page where you are able to see what other users are up to on a daily basis, this is a scroll menu so that you are able to scroll to your hearts content reading about the other users activities.
5	News Upload		This is the news upload page, this is the form that you will fill in for the other users to then be able to open up the app and see what you are up to for the day.

6	Comedy		This is the comedy page where you will be able to read all the user submitted jokes. Again, this is a scrollable page meaning you can have limitless laughs reading all the users' hilarious jokes.
7	Comedy Upload		This is the page that will be used for you to upload your own jokes for the other users to read and enjoy, simply type your jokes title, the joke itself and then click upload.
8	For Our Eyes Only		This is the For Our Eyes Only page where users are able to give is feedback on the shows or tell us their thoughts, here the user will be able to put a title such as "feedback" or "problems at home" to give the staff some context before reading the content of the submission.
9	Challenges		This is the challenges page where the users will be able to read over all of the challenges that they staff members have added to the page and pick if there are any they would like to do.
10	Challenge upload		This is the challenge upload where the users will submit what they have done for their challenge, they begin by choosing the challenge they did from the drop down and then go on to explain their challenge and upload photos of the completed project.


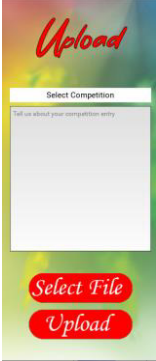
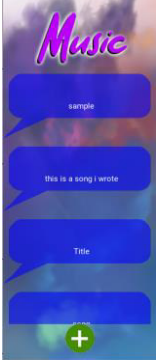
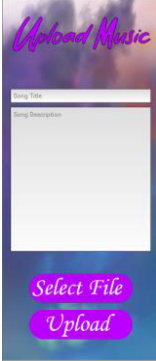
11	Competition		This is the competition page, this is very similar to the challenges page but instead of the staff proposed challenges being mini projects got the users, these will be staff proposed tasks such as doing a wordsearch etc.
12	Competition Upload		This is the competition upload where you will be choosing the competition that you did, then describe the tasks maybe a unique way you approached it etc, Then you upload a image of the completed task using the "Select File" button and then send it off to Beyond Words using the "Upload Button"
13	Music		Here we have the Music page where you can see all of the titles to the music that users have upload, then if there are any they sound interesting, you just need to press on the message box and you will be able to play the sound file attached and enjoy.
14	Music Upload		Lastly but not least, we have the music upload file, this is where you upload music that you have made. Here you add a title and anything you may want people to know about the music, then you search for the .mp3 file of your music and upload.

Table 4 Prototype Screens with Explanations

6.2.2 Test Cases

ID	Test	Expected Result	Real Result	Fix
1	Open application	Should open on the login screen	Opens on the login screen	N/A
1.1	Close Application	Should stop all processes in the application	Stops all processes in the application.	N/A

Home Screen	Home Screen	Home Screen	Home Screen	Home Screen
2	Press the login button with nothing entered	The application should show an error saying invalid username or password	The application shows a message saying invalid username or password	N/A
3	Press the login button with just a username	The application should show the invalid username or password message and clear the username field	The application shows the invalid username or password message and clears the username field	N/A
4	Press the login button with just a password entered	The application should show the invalid username or password message and clears the password field	The application shows the invalid username or password message and clears the password field	N/A
5	Press the login button with a correct username but wrong password	The application should show the invalid username or password message and clear both fields	The application shows the invalid username or password message and clears both fields	N/A
6	Press the login button but with a wrong username and correct password	The application should show the invalid username or password message and clear both fields	The application shows the invalid username or password message and clears both fields	N/A
7	Press the login button with a correct password and a correct username	The application should log you in and bring you to either the register or main menu page	The application logs you in and takes you to either the register or main menu page	N/A
Register Page	Register Page	Register Page	Register Page	Register Page
8	Press the register button without any information entered	Should show a message saying the passwords do not match	Shows a message saying the passwords do not match	N/A

9	Press the register button with only a name entered	It should tell you the passwords don't match	It tells you the passwords don't match	N/A
10	Press the register button with a name and a wrongly formatted birthdate and matching passwords	It should say invalid birthdate and clear the field	It says invalid birthdate and clears the field	N/A
11	Press the register button with a name, correct birthdate and matching passwords	It should say invalid username	It says invalid username	N/A
12	Press the register button with a name, correct birthdate, and a username.	It should say passwords to not match	It says passwords do not match	N/A
13	Press the register button with a name, correct birthdate, username and a password (leaving confirm password empty)	It should say passwords do not match and clear the password field	It says password do not match and clears the password field	N/A
14	Press the register button with a name, correct birthdate, username, and 2 passwords that do not match.	It should say passwords do not match and clear both password fields	It says passwords do not match and clear both password fields	N/A
15	Press the register button with a name, correct birthdate, username, and 2 passwords that match	It should ask you to pick a school	It asks you to pick a school	N/A

16	Press the register button with a name, correct birthdate, username, 2 matching passwords, and a chosen school from the dropdown.	It should register the account and bring you to the main menu	It registers the account and brings you to the main menu.	N/A
Main Menu	Main Menu	Main Menu	Main Menu	Main Menu
17	Click the News tab	You should be brought to the news page	You are taken to the new page	N/A
18	Click the Comedy Tab	You should be brought to the comedy page	You are taken to the comedy page	N/A
19	Click the FOEO tab	You should be brought to the FOEO page	You are taken to the FOEO page	N/A
20	Click the Challenges tab	You should be brought to the challenges page	You are taken to the challenges page	N/A
21	Click the Competition tab	You should be brought to the competition page	You are taken to the competition page	N/A
22	Click the Music tab	You should be brought to the music page	You are taken to the music page	N/A
News Page	News Page	News Page	News Page	News Page
23	Click the pages title.	You should be taken to the main menu	You are taken to the main menu	N/A
24	Click the add button	You should be taken to the news upload page	You are taken to the news upload page	N/A
25	Click the message boxes	The message box should change to a square to make it easier to read	The message box is changes to a square to make the text easier to see.	N/A
News Upload	News Upload	News Upload	News Upload	News Upload

26	Press the upload button without any information	A message saying invalid information should pop up	You get a message saying invalid information	N/A
27	Press the upload button with just a title	A message saying invalid information should pop up	You get a message saying invalid information	N/A
28	Press the upload button with just a description	A message saying invalid information should pop up	You get a message saying invalid information	N/A
29	Press the upload button with both a title and description	The information should be added to the database and you should be taken back to the main menu	The information is added to the database and you are taken back to the main menu.	N/A
30	Press the page's title	You should be taken back to the main menu	You are taken back to the main menu	N/A
Comedy Page	Comedy Page	Comedy Page	Comedy Page	Comedy Page
31	Click the page's title	You should be taken back to the main menu	You are taken back to the main menu	N/A
32	Click the message boxes on screen	The message box should change to a square	The message box changes into a square.	N/A
33	Click the plus button	You should be taken to the comedy upload page	You are taken to the comedy upload page	N/A
Comedy Upload	Comedy Upload	Comedy Upload	Comedy Upload	Comedy Upload
34	Click the title of the page	You should be taken back to the main menu	You ate taken back to the main menu	N/A
35	Click the upload button with no information entered	you should get a message saying invalid information	you get a message saying invalid information	N/A
36	Click the upload button with just a title entered	you should get a message saying invalid information	you should get a message saying invalid information	N/A

37	Click the upload button with just a joke entered	you should get a message saying invalid information	you should get a message saying invalid information	N/A
38	Click the upload button with both a title and joke	the joke should be submitted to the database and the user should be taken to the main menu	the joke is submitted to the database and the user is taken back to the main menu	N/A
FOEO Page	FOEO Page	FOEO Page	FOEO Page	FOEO Page
39	Click the page's title	you should be taken to the main menu	you are taken to the main menu	N/A
40	Click the upload button with no title	you should get a message saying invalid information	you get a message saying invalid information	N/A
41	Click the upload button with no description	you should get a message saying invalid information	you get a message saying invalid information	N/A
42	Click the upload button with both a title and description	the information should be submitted to the database and the user should be taken back to the main menu	the information is submitted to the database and the user is taken to the main menu	N/A
Challenges Page	Challenges Page	Challenges Page	Challenges Page	Challenges Page
43	Click the page's title	you should be taken back to the main menu	you are taken back to the main menu	N/A
44	Click the message boxes	the box should change into a square for easier readability	the box is changed into a square for easier readability	N/A
45	Click the plus button	you should be taken to the challenges upload page	you are taken to the challenges upload page	N/A
Challenges Upload	Challenges Upload	Challenges Upload	Challenges Upload	Challenges Upload

46	Click the page's title	you should be taken back to the main menu	you are taken back to the main menu	N/A
47	Click the upload button without anything inputted	you should get a message saying invalid information	you get a message saying invalid information	N/A
48	Click the upload button with just a challenge chosen	you should get a message saying invalid information	you get a message saying invalid information	N/A
49	Click the upload button with just a description	you should get a message saying invalid information	you get a message saying invalid information	N/A
50	Click the upload button with just a file selected	you should get a message saying invalid information	you get a message saying invalid information	N/A
51	Click the upload button with a challenge and file selected	you should get a message saying invalid information	you get a message saying invalid information	N/A
52	Click the upload button with a challenge selected and description inputted	you should get a message saying invalid information	you get a message saying invalid information	N/A
53	Click the upload button with a description and file inputted	you should get a message saying invalid information	you get a message saying invalid information	N/A
54	Click the upload button with a challenge and file selected along with a description inputted.	the information should be uploaded to the database and the user should be taken back to the main menu	the information is uploaded to the database and the user is taken back to the main menu	N/A
Competition Page	Competition Page	Competition Page	Competition Page	Competition Page

55	Click the page's title	you should be taking back to the main menu	you are taken back to the main menu	N/A
56	Click the message boxes within the page	the message box should change into a square for easy readability	the message box does change into a square for easy readability	N/A
57	Click the plus button	you should be taken to the competition upload page	you are taken to the competition upload page	N/A
Competition Upload	Competition Upload	Competition Upload	Competition Upload	Competition Upload
58	Click the page's title	you should be taken to the main menu	you are taken to the main menu	N/A
59	Click the upload page with nothing inputted	you should get a message saying invalid information	you get a message saying invalid information	N/A
60	Click the upload button with just a competition chosen	you should get a message saying invalid information	you get a message saying invalid information	N/A
61	Click the upload button with just a description added	you should get a message saying invalid information	you get a message saying invalid information	N/A
62	Click the upload button with just a file selected	you should get a message saying invalid information	you get a message saying invalid information	N/A
63	Click the upload button with a competition selected and a description	you should get a message saying invalid information	you get a message saying invalid information	N/A
64	Click the upload button with the competition and a file selected.	you should get a message saying invalid information	you get a message saying invalid information	N/A
65	Click the upload button with the	you should get a message saying invalid information	you get a message saying	N/A

	description and a file selected		invalid information	
66	Click the upload button with a file and competition selected and a description added.	the information should be uploaded to the database and the user should be taken back to the main menu	The information is uploaded to the database and the user is taken back to the main menu	N/A
Music Page	Music Page	Music Page	Music Page	Music Page
67	Click the page's title	the user should be taken back to the main menu	the user is taken back to the main menu	N/A
68	Click the message boxes	the message box should change into a square	the message box does change into a Sky	N/A
69	Click the plus button	you should be taken to the music upload page	you are taken to the music upload page	N/A
Music Upload	Music Upload	Music Upload	Music Upload	Music Upload
70	Click the page title	the user should be taken to the main menu	the user is taken to the main menu	N/A
71	Click the upload button with nothing inputted	you should be asked to please enter an MP3 file	you are asked to please enter an MP3 file	N/A
72	Click the upload button with just a title	you should be asked to please enter an MP3 file	you are asked to please enter an MP3 file	N/A
73	Click the upload button with just a description	you should be asked to please enter an MP3 file	you are asked to please enter an MP3 file	N/A
74	Click the upload button with just a mp3 selected	you should get a message saying invalid information	you get a message saying invalid information	N/A
75	Click the upload button with a title and description inputted	you should be asked to please enter an MP3 file	you are asked to please enter an MP3 file	N/A
76	Click the upload button with a	you should get a message saying invalid information	you get a message saying	N/A

	title and mp3 file selected		invalid information	
77	Click the upload button with a description and music files selected	you should get a message saying invalid information	you get a message saying invalid information	N/A
78	Click the upload button with a title, description and a non mp3 file	you should get a message saying please enter an MP3 file	you get a message saying please enter an MP3 file	N/A
79	Click the upload button with a title, description and mp3 file	the file should be put into a folder, the other information should be put to the database, and the users should be taken back to the main menu	the file is put in another folder, the information is put on the database, and the user is taken back to the main menu	N/A

Table 5 Test Table for System

6.2.3 Changes

Overall, I am very happy with how close my project is to the original design and the majority of the changes that I have made if anything has made the application better and have not been coding compromises which I was expecting.

The first minor change from the designs can be seen on the login page, within the text boxes on the designs we had an icon for username and password, I changed this to just being the words and a watermark that said username and password as the client said it looked a lot more modern and removed clutter from the screen. Both the client and I were happy with this change.

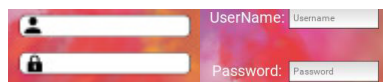


Figure 9 Comparative Login Pages

The main menu page has changed by separating challenges and competitions into 2 separate tabs, this was on the request of the client, but this was a very easy change, and I was happy to oblige, plus it meant there were 6 tabs now on the main menu which looking cleaner.



Figure 10 Comparative Main Menus

The Music page has changed from having the audio waves of the file to just have the titles of the music which users then click and start. I am not too sure which I am happier with but for the complexity level I had to go with the design that I have the time to implement into the application. If I was to develop this more, I think I would come up with a separate design from both of these or a merge of both.

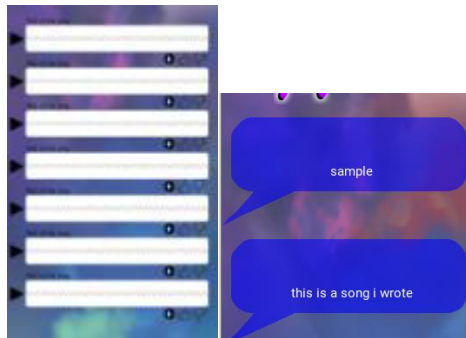


Figure 11 Comparative Music Pages

Within the challenges page we were going to have a button to accepting challenges, this would have added more complexity to the user's database, and we did not see the point in this when in reality the users can just pick from a drop-down list. I am happy with this as it removes clutter and complexity.

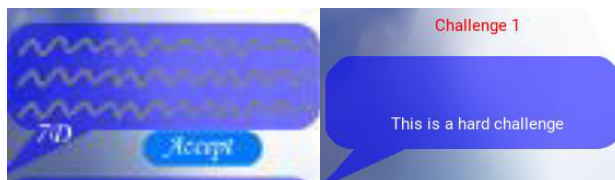


Figure 12 Comparative Challenge Message Boxes

The New page changed from set messages they would be allowed to say, to the freedom on writing what they wanted. The change was after getting feedback from the demographic of the application who said they would not use the feature if they were restricted. The restricted feature was originally the clients Idea that I did not really like, so having this change is definitely positive.

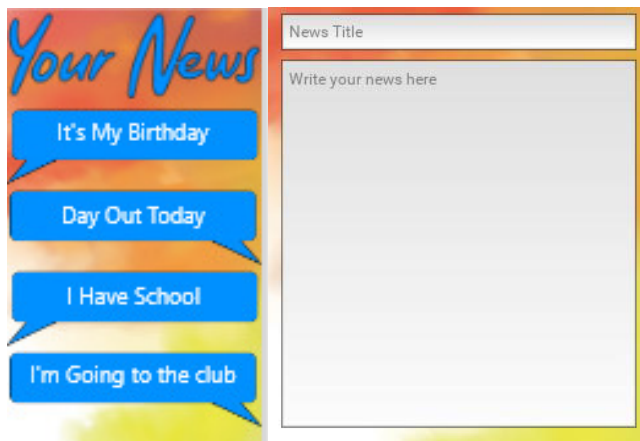


Figure 13 Comparative News Pages

The FOEO page has changed from 2 pages, one to upload and one to explain what you are allowed, to just the upload page, this is because all the information needed will be on the card that the users are given with the credentials. This change was primarily because of trying to word the page on the application was very difficult so instead the card will just say that any thoughts, concerns, or feedback can be written to the staff members here.

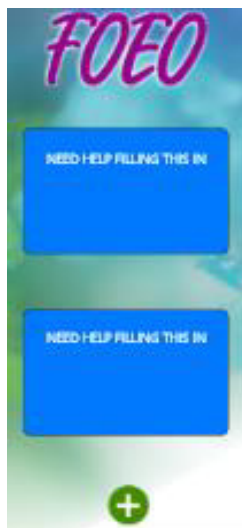


Figure 14 Deleted FOEO Page

We have also taken the “Type” attribute from the upload pages as we felt it was useless, if this ever changed, it would be an easy implementation, but we could not see how it would be useful at the time.

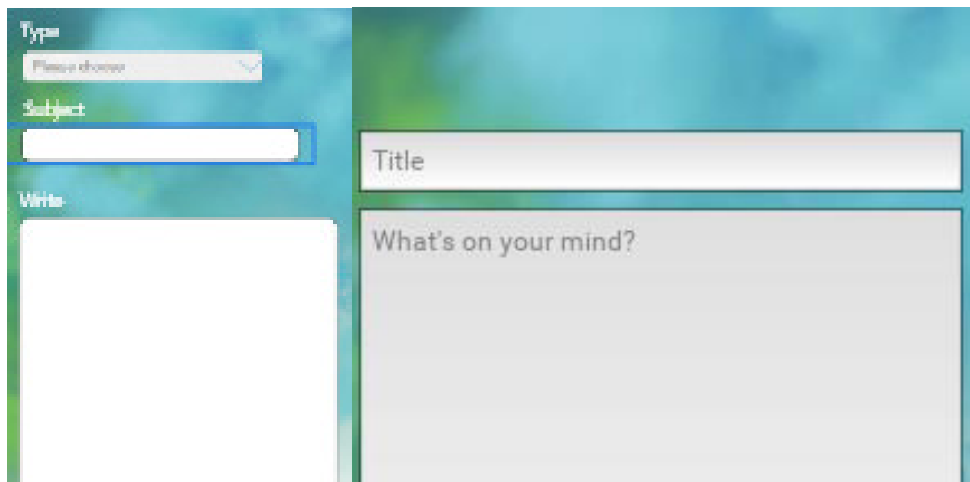
The image shows two side-by-side form layouts. The left layout is a vertical stack of three elements: a 'Type' dropdown menu with a blue arrow, a 'Subject' text input field, and a 'Write' text area. The right layout is a vertical stack of two elements: a 'Title' text input field and a 'What's on your mind?' text area. Both layouts are set against a light blue background with a subtle pattern.

Figure 15 Comparative Type Feature

Within the design, there were a few pages missed or added throughout the process. The biggest change is the addition of the Register page, this was going to begin as users who would fill in a form at the event, that would then be manually entered into the database. It was my idea to instead having a provided default credentials and then have users modify their profile as they log in. I am very happy with this change as it will save so much time and money by not needing staff to enter the details in.

6.3 Overcoming the Challenges/Limitations

6.3.1 Time

To get over the issue of time, I will be making sure that I am sticking to a strict schedule that will help me keep on track and make the most use of the time I do have to make the best product possible. There are 3 strategies (Ashley Difranza, 2019) that I will be sticking to, to make sure that I am working efficiently.

Firstly, I will make sure that I have a well-defined project plan. I will be trying my best to make sure that my project plan has all the different aspects of my project in from the main points such as programming to little tasks like updating my trello board at certain times. I will never be able to think of every single point that would be needed and there will be times that the time scale that I estimate is wrong, but this will still make me work a lot more effectively than if I did not do this.

The second strategy is to make sure that I am keeping in constant communication with my superiors to make sure that I am not developing or working on pieces of the project that are not actually needed or wanted. When it comes to communication, I am looking to have a minimum of 1 meeting a week with my supervisor and then 1 meeting a month with my client. As my supervisor has done these projects before, I will be able to give her weekly updates on what I have done and what I am planning to do in the time before our next meeting and she would be able to tell me what needs more work, what I have done well and if there is anything within my plan that would be useless.

Lastly, I will also be making sure that even with the plan I have in place, I am able to stay flexible. As I am not a professional in this field there are going to be tasks that take me longer, work I have not accounted for and work that I thought would be needed but is pointless. For these reasons I am

going to make sure that I am flexible and able to change my approach whenever needed. For example, If after a meeting with my supervisor they say that something needs more work and a part of my plan for the week ahead isn't needed, I will then use the time gained from not including something to work on part that needs more work.

6.3.2 Experience

When it comes my experience, there are 2 main rules that I will be looking to follow. Firstly, make sure that anything I learn from resources online, I understand to the fullest extent as otherwise later down the road when bugs start happening, I will have no idea on how to fix them. Secondly, make sure that I communicate with professionals within the field and ask for any help needed.

When it comes to learning online, It is very easy to get into the trap of seeing the code that you need, copy and pasting it and then being happy that you have solved the problem. The issue with this comes later when you realise that you do not understand what the code you have really does and a bug comes up within that section. You then need to spend more time researching the same topic, but this time researching it properly meaning the first bit of research that you have done is not irrelevant as you need to do it and more over again. Where it was research to a full understanding to begin, then you would not have this problem and would end up saving a lot of time.

When it comes to communication, the best way that I learn is from 1-1 learning. If I surround myself with professionals in the fields that will be needed for this project, it will mean that if I come to an impasse where I cannot understand something, I will always have then that I will be able to ask for help. This will mean that if I am ever very stuck, I will not have to spend days on the problem but instead go past it until the professional has time for a meeting with me and then have then explain it to me. This is usually enough for me to then understand what I need to get unstuck and continue with my project. In the long run this will help me learn and also assist the speed in which I learn meaning it will also help my time restrictions.

6.3.3 Client Demands

The main way that I am looking to manage my clients demands is by good communication. As explained, I will be looking to have a monthly meeting with my client where I am able to show them what I have done, and they will be able to tell me what they like and dislike. As I am on a strict time restriction, after we have both agreed on the design, I will then get the design programmed as close as possible and then have another meeting with the client to see what they think. With this I will also be giving the client a time scale explaining how long I have left in the development stage. Then for each of the improvements that they want, I will tell them how long it will take and add it to the time scale, if the amount they want goes over the time scale, then they will either need to change it to fit in the time given or expect it to only become partially complete within this proof of concept application.

I feel this is a good way to manage my client as this way they will be in control of what is going into their app, but I will be able to give them realistic expectations and not promise them the world and not be able to deliver.

7. Future Work

8. Conclusion

Overall, I am very happy with the way in which the application turned out. There are a few rough edges I would have liked to have had time to fix but the whole application is functional and looks good enough for children to enjoy using it.

One of the biggest setbacks I had within this project was my personal health, as I have an unconfirmed medical condition that causes seizure like fits on a daily basis, this took a lot of the time that I had away from me. In some cases, after this I would end up needing the whole week off and this would put me quite far behind schedule. I believe that I have adapted well to working around this but am still disappointed with the thought of how much more polished this application could have been if this did not happen. I feel, if I were in good health, it would have been possible to get this application deployed onto the android play store and had a small sample of users testing it out and having fun.

The client was very happy with the overall project and loved the enthusiasm that I had for the project. They loved the creative design that I came up with by using their logo background as the background of the app and thought that all the bright fun colours are perfect for the audience we are looking to target. The client was so happy with the application that if they are able to get more funding, they may look into employment for me to finish the project to its fullest someday.

9 Reflection

9.1 What went well?

To begin I would say that the project as a whole went pretty well with a few key points attributing to this. Firstly, the time management of the project, throughout this project I would micromanage the time, when time was lost, I would change the timing for this up, and when time was gained this would also be added. I feel if I did not do this, the project would have been a little messier as this gave me hard deadlines for things and meant I had to move on. If I did not move on at the times I did, yes a few of the features would be a little more polished but a few other features would most likely not work at all.

Secondly, my communication skills really helped within the project. By keeping constant communicate with not just my client but also my supervisor, I was able to get some very good advice. There were times in the project where I was working on things that I thought would have been important but in reality, aren't really needed, my supervisor who has more experience with this helped me make sure that I was not wasting time in these areas. For me client, keeping in constant communicate meant that when they had changed their mind on different features within the project, I had not gone too far into programming it meaning I did not lose too much time. This would have not been so important if the client did not want to change the project as much, but after the project proposal the client then went to the demographic of the application for some more advice, and this is where the changes came. I am happy I was able to make the changes so that the users will have a product that fully caters to them.

The coding of the application went a lot smoother than I originally thought it would. If I were to do this project a year or more before now, this would have been near impossible, but with the amount

of spare time I have been putting into coding really helped as even learning a new module was a lot easier with the experience that now have.

Lastly, the project was a field that I was interested in which meant that I did not get burnt out at any point within the project and I only ever wanted to get back and progress more to make the best project possible. After talking to others within my university course, this gave me around a 3 week advantage as those who did get burnt out ended up having around 3 weeks where they weren't able to motivate themselves to keep going.

9.2 What went badly?

As I explained within the conclusion, a big drawback to this project was my personal health. This was unavoidable so I just must accept it for what it is and be fortunate that I am still able to complete the project and be happy with the result.

My managing up skill went pretty badly in respect to the client. In general, I am usually pretty good at managing up within a team scenario etc. But when it came to working with an external company, I found this a lot more difficult as I felt like they were more than me when in reality I should have trusted that I know more about the technology sector and I should have outlined things from the beginning, but this took me a little while to get the confidence to do.

Throughout this project I have done the documentation in blocks instead of procedurally. This was somewhat of a hinderance as a lot of the time, by the time I came to doing the documentation I had to then go back and find all of my references, or remind myself on the specific details within that piece and it meant that overall the documentation probably took me around 50% more time as I was too busy doing some of the more "fun" parts to the project and seeing real results.

9.3 What would I do differently next time?

If I were to do this project again the first thing that I would work on is rectifying anything that I felt, went badly the first time around. I would start by making sure I start this project in a time where my personal health is good, and I would not be hindered by it.

Next, I would remember that I know more about this sector than the client who just has a vision and does not really understand how it comes together in the background. I would work on explaining to the client in simple terms who much time things take and make sure that we come up with a final design that will not be modified before I start the coding, as even though I tried that this time, I gave in and let them make changes that I then had to program.

I would also make sure that I had more discipline with myself to make sure that I do all the documentation progressively as this will give me a lot more time for other things and will also mean that I will be writing the documentation first-hand instead of just how I remember it a few days or weeks later as sometimes I feel like looking back on coding it can seem easier than it really was and the documentation will not then show the real struggles that you face.

Lastly, If I were to do this project again, I think I would change the language in which I do it in. Doing it in python was okay and fun to do as I already knew the language but because of the way you convert it into a mobile application I don't feel like this is the most optimum way. Plus, if I was in good health this would give me a lot more time which is the time that I would then use to learn the

new language along with having time before starting this project again to also learn a better language for mobile apps.

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Appendix A

Screenshots and Diagrams



