

Final Prototype Documentation

Team Four

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CareerCourse

CareerCourse is a learning tool designed to improve STEM education for children from rural areas. It is a learning management system (LMS), in which gamification is used to encourage students to progress in their studies, to develop and grow their avatar, in turn unlocking virtual excursions.

Many of its features are designed with the aim of communicating the practicality of STEM content, in accordance with our first design goal from our research phase.

Design Goal #1

Communicate the practicality of a variety of subjects, and show the value they can bring to local communities as well as the macro level.

Design Goal #2

Inform and educate leaders of the community (teachers and parents) about how to cater for students/how to learn

Our research early in semester showed that students in rural contexts had a difficult time seeing the usefulness of school content. Being far-removed from the rest of society, many careers, facilities, technologies, services and other outlets don't have a visible place in their immediate context. It is common for these children to spend after-school hours occupied with the family business, which tends to mostly be farming or agriculture related. Other occupations include running local restaurants, or depending on their location, tourism related services. This means that students spend little time and attention towards their homework, or any pursuit which relates to advancing their education or aspiring for a future beyond what is immediate to them.

Students have very little exposure to alternatives to the aforementioned careers or the idea of pursuing further education. It is no surprise then that students see a disconnect between the content they study at school, and the roles which bring value to their communities and immediate surroundings. CareerCourse aims to increase and personalize exposure to STEM related careers and industries.

The avatar progressing and leveling up is a representation of learning's impact. It shows the fruits of academics in their character's progression. The virtual excursions themselves, hosted by professionals from the site, is direct exposure to how science, technology and mathematics help provide the services which the world depends on - a rare sight in rural contexts.

The screenshot shows two adjacent lessons from a module:

- Lesson 1: Endoscopes** (Completed)
 - Description: Total internal reflection occurs when light rays travel through an angle of incidence greater than the critical angle. Light rays that travel through the interface between a medium and air trapped in the medium. For this to happen the refractive index of the medium carrying the incident light must be greater than the refractive index of the medium into which light attempts to escape.
 - Text: An optical fiber is a glass core surrounded by a cladding of lower refractive index. Light is trapped inside the core by total internal reflection and hence can be transmitted over distances, even if there are bends in the optical fiber.
 - Description: At most basic, endoscopes are simple bundles of up to 10,000 optical fibers. Endoscopes are used in medical procedures to examine internal organs and structures without making a large (open) cut or having a doctor enter a patient's body to create a 2D image. Each optical fiber is between 2-25 µm.
 - Description: The glass fibers bundles can have different ends. A common bundle is where the core fibers have the same purpose (receiving each other at each end). These bundles are used to carry light from the eye of a surgeon to the eye of a surgeon. Other types of bundles have different ends for better resolution. However, these types of endoscopes are not as common as the ones mentioned above.
- Lesson 2: Radioactivity** (Completed)
 - Description: Isotopes of an element are varying forms of the same element, i.e. each atom has the same number of protons, but they have different numbers of neutrons. An isotope that is radioactive will have an unstable nucleus and will emit radiation from its nucleus in order to make it stable.
 - Description: There are three main types of radiation:
 - Alpha particles which are small helium nuclei. Its large mass means that it cannot penetrate more than a few millimeters inside the body and is one of the least dangerous types of radiation.
 - Beta particles are electrons released when a neutron in the nucleus decays to form a proton and a fast-moving electron. Beta particles have a higher mass than alpha particles and therefore can penetrate further than alpha particles and have only a $\frac{1}{e}$ chance, it is still not suitable in medical imaging.
 - Gamma rays are high-energy photons emitted when a nucleus undergoes beta decay or when beta particles decay. They have a much greater penetrating power than both alpha and beta and are the most dangerous type of radiation. Meaning that they can penetrate deeper than beta and alpha radiation and can damage cells in the body and in the brain.
 - Description: Radioisotopes are used in medical procedures to either detect or treat diseases. One of the most common uses of radioisotopes is in nuclear medicine. The radioactive substance is decayed and then it is consumed, then the body uses the substance to decay and then it is removed.

As users complete parts of a lesson, their avatar gains experience

The first screenshot shows a green circular progress bar with a character icon in the center, labeled "Level 1". Below it, a message says "+20 XP" and two buttons: "Next Lesson" and "Do it later". The second screenshot shows a blue circular progress bar with the same character icon, also labeled "Level 1". Below it, a message says "+20 XP".

The screenshot shows a landing page with the following elements:

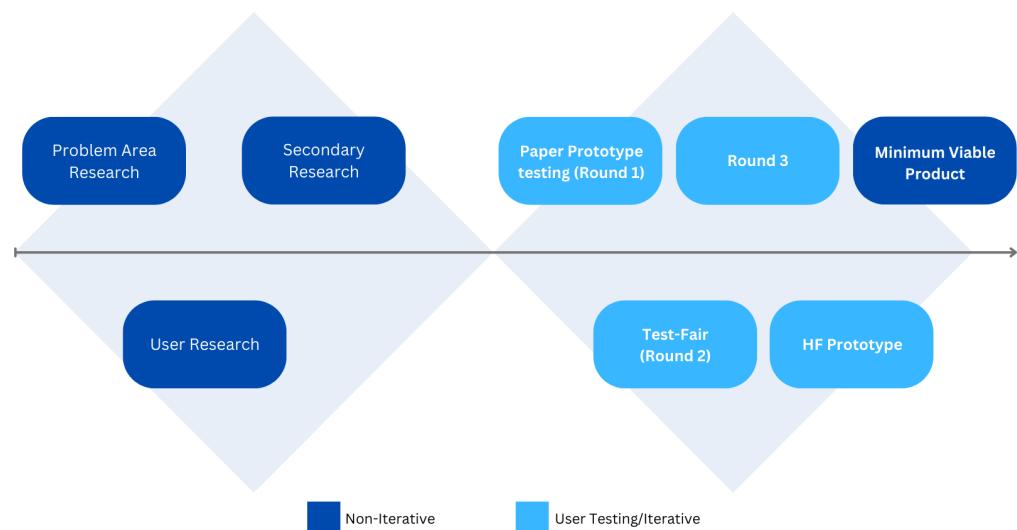
- Headline:** Experience your subjects in the real world.
- Icons:**
 - Experience science and math applied in every industry
 - Hospital by professionals
 - See a day in the life of 5700+ related professionals
 - Be at the forefront of revolutionary advancements
- Excursion Catalog:**
 - Subject: Royal Prince Alfred Childrens Hospital, New South Wales, Australia (Nov 28)
 - Facility: Kingsford Smith Airport, Mascot, NSW (Dec 16)
 - Facility: Sydney Water, Sydney, NSW (Jan 10)
- Unlock badge:** Royal Prince Alfred Childrens Hospital! (A building icon with a red cross)
- Text:** You have unlocked... Royal Prince Alfred Childrens Hospital!
- Call-to-action:** Let's Go! (button), Check it out later (button), Visit the excursions page to see more.

Avatars of a certain level of experience unlocks excursions

Tying the school curriculum closely with its application in the real world allows students in the rural context to see how it makes an impact to society, and inspires students to pursue careers and further education.

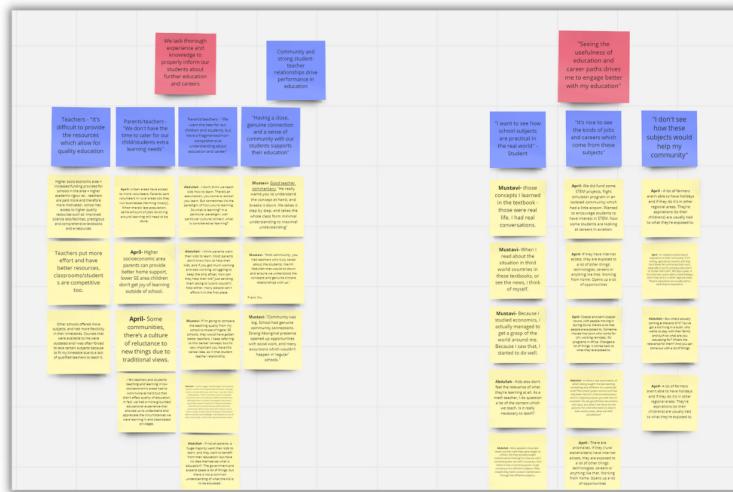
Our Design Process

Our team was provided the brief of solving one the United Nations 17 goals surrounding sustainability. We chose to focus on the goal 'Quality Education' as our problem area. We employed a double diamond design process involving four stages shown below: Discover, Define, Develop and Deliver.



Discover:

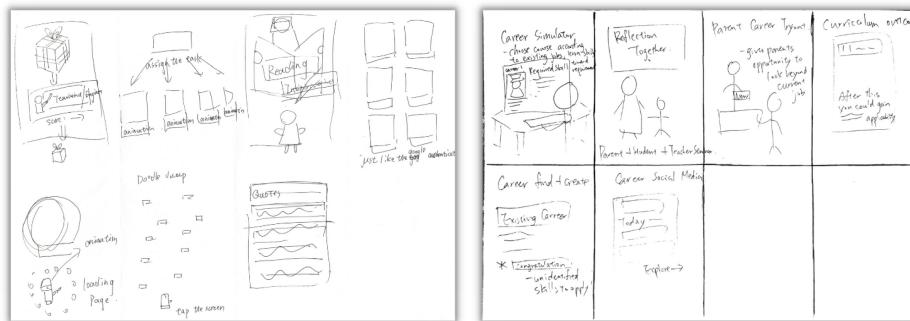
We embarked on our process with extensive secondary research to understand the context we were designing for. Having found some leads, we proceeded to interview people from rural and low socio-economic backgrounds. We also distributed surveys to students from various schools in all ranges of socio-economic status. From our research, we were able to extract two key insights.



Qualitative data seemed to cluster around two main themes

Define:

We were able to extract our two key insights from our affinity diagramming. These insights shaped our design goals for what would be our concept. We began to ideate solutions using techniques such as Crazy 8's and Forced Association.



We came up with over 40 different undeveloped concepts, and mixed and matched features between our concepts.

Develop:

Paper Prototypes

To filter out concepts most effective at achieving our design goals, we created a decision matrix with criteria based on our insights, the constraints of the rural context, and general accessibility and usability considerations. We prototyped our concept over multiple iterations

on Figma, improvising additional features, usability and aesthetics of the design based on user testing feedback along the way.

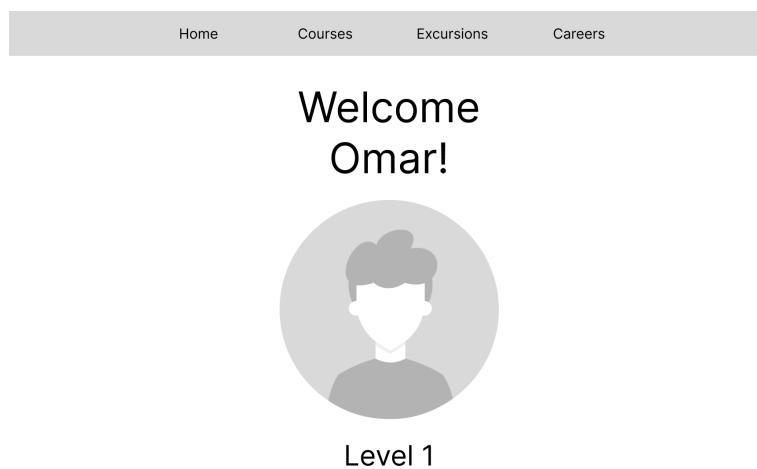
CareerCourse was one of three final concepts we filtered out. We created paper prototypes of essential screens which focused around demonstrating the concept's main features, which included avatar customisation, moving through course content, leveling up and progression and finding excursion and career-related information. Paper prototyping would allow us to make quick, low-cost changes and refinements to our concept.

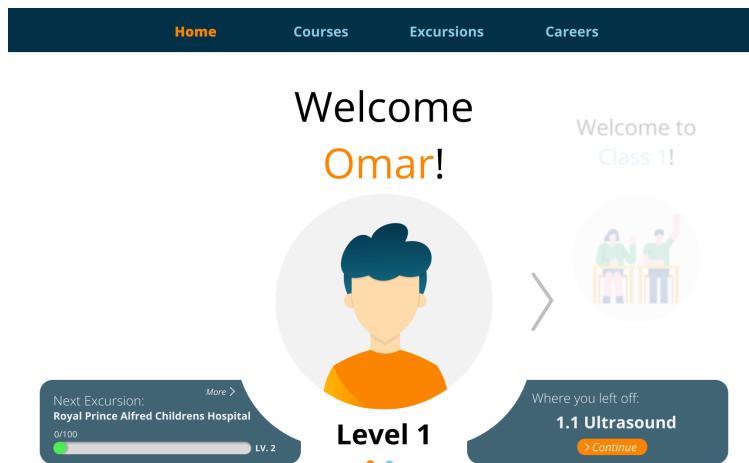
Low fidelity screens (Wireframes)

We received a series of feedback which shaped our wireframes in the next stage. A lot of the feedback revolved around understanding the value of our concept, as well as the purpose of each feature specified. Consequently, changes mostly revolved around understanding the purpose of the various features such as the avatar's progression and virtual excursions. Using Figma in this round, we were able to implement a number of changes which included introductory screens which introduced the application.

Low to Mid-fidelity screens

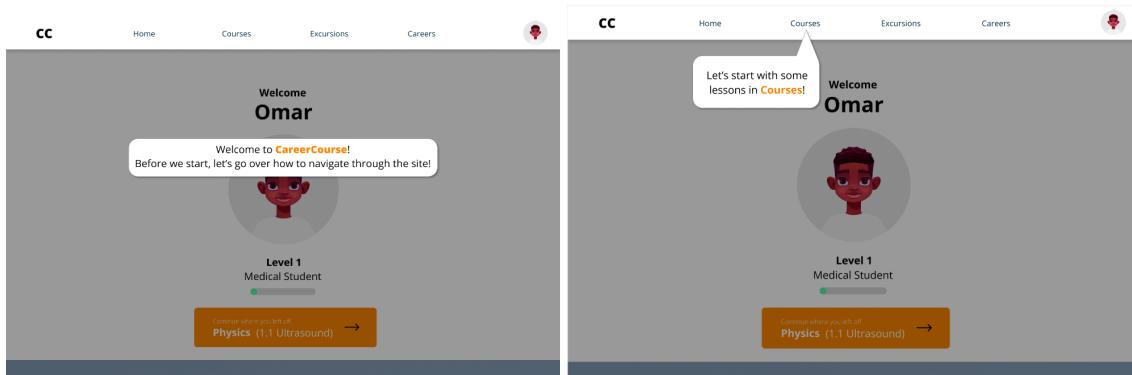
Between our wireframes and mid-fidelity, we continued to iron out points of confusion, and general accessibility and heuristic issues. The testing round here involved other design students as participants who were able to easily identify areas where usability could be improved. This round introduced calls to action which took users directly to the desired place instead of letting them find out themselves. For example, when avatars leveled up, beyond a description saying new excursions had been unlocked, users would be taken directly to the excursions page





Mid-Fidelity to High Fidelity

From the last round of iteration, the users responded to our mid-fidelity prototype that other than the functions itself, more descriptive guidance and the usability aspect of the presentation of these features should be better implemented, especially for users that have zero experience with similar platforms. Therefore in the final high-fidelity prototype, we included more error recovering interactions and more importantly a descriptive guide-through that takes the user through the site in their first launch to gain proper understanding prior to engaging in any interactions.



With the high fidelity prototype, the main difference, other than the more adhering to our design system polished looking aesthetics and avatars, is that the user now can store their module progression as they navigate through the platform. This indicates that, compared to the mid-fidelity prototype where the module section is only crafted for the purpose of showcasing and does not allow users to stop halfway from completing the entire course module, now with the high-fidelity prototype the platform actually mimics the experience of utilizing a database that keeps track of the users progression in leveling up.

Considering the main feature of avatar, we also implemented the presence of avatar in more portions of the user experience to emphasize the impression and link between the user and their chosen avatar. This includes an always-displayed profile panel on the upper corner that

includes both self progress report and a classroom feature that allows users to also see the progression of other classmates.

Deliver:

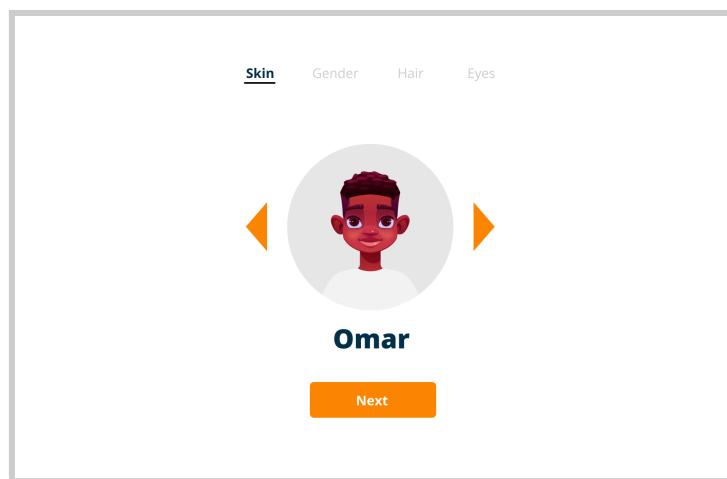
We created our final prototype - a minimum viable product of the CareerCourse application which aims to showcase its core features. The prototype was made on Figma which can't utilize a database and text inputs. As a result, we aimed for our prototype to showcase all the core functionalities, but use a dummy dataset throughout its usage.

Core Functionality

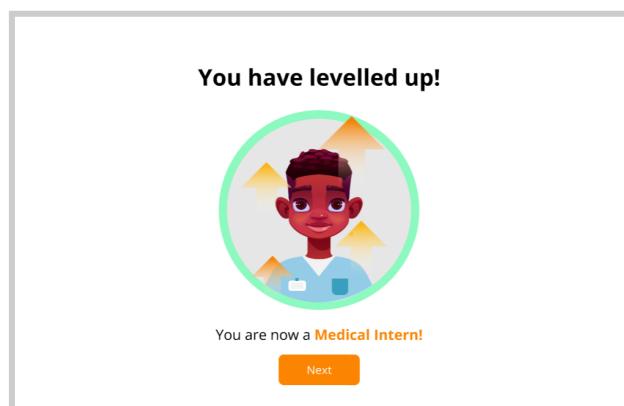
Functioning similar to many standard LMS platforms, including features such as course module system and classroom features, CareerCourse differentiate its main approach from other similar products with its core functionalities:

1. Avatar upskilling

Entering the platform, users would be able to customize an avatar that represents themselves. The purpose of the avatar is to not only reflect the growth the user has gained through leveling up in their subject courses, but also act as a representation of themselves in experiencing career outcomes through virtual excursion and character rankings/titles.



Once the user has settled with an avatar of their choice, their avatar would start from level one and requires the user to level up their avatar via the course material. With each lesson completed, the user would earn experience points accordingly. Once enough experience points are gained, the avatar would be leveling up with animation shown and received a new title according to the subject material they have completed.

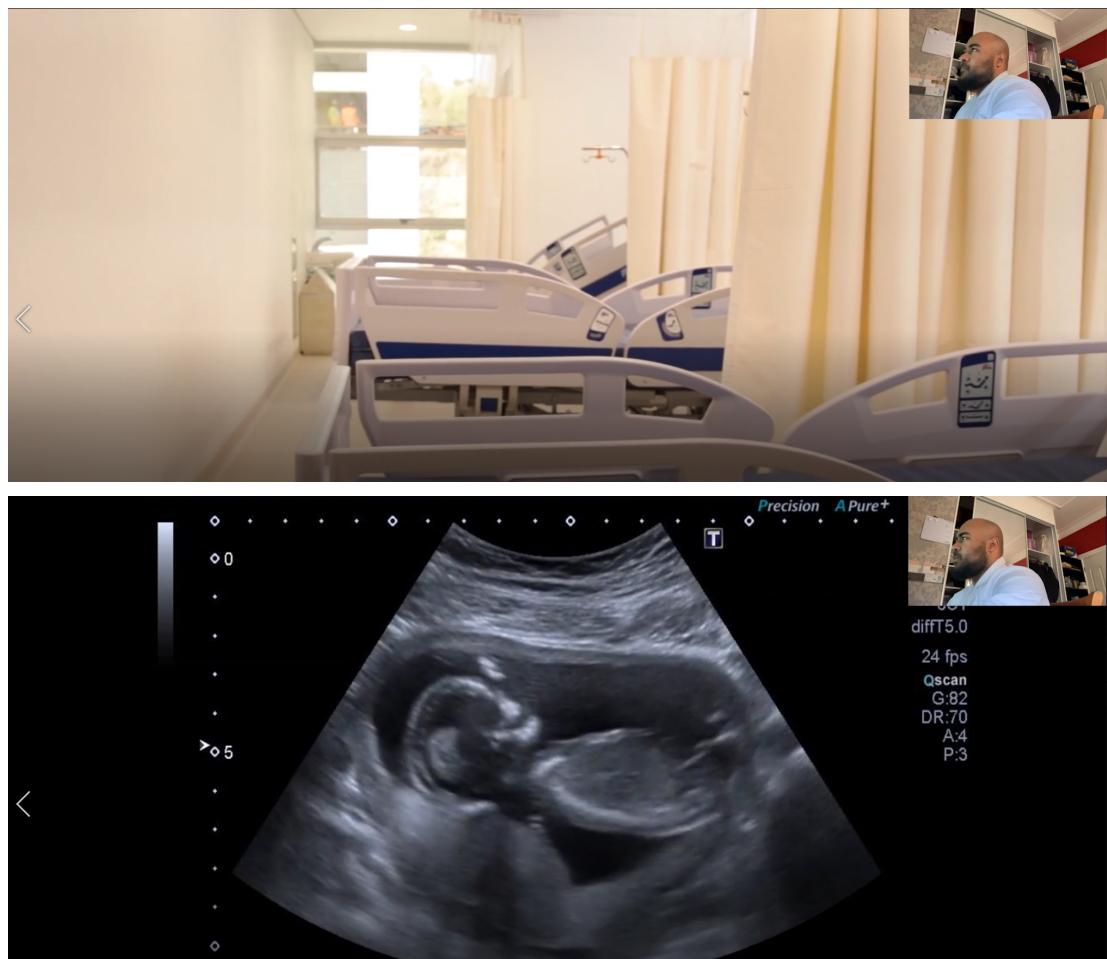


The achieved levels are then tied with the unlock system of the virtual excursion, which would act as a reward system to motivate the user to better engage with the course material.

2. Virtual Excursions

The Virtual Excursions provide the most value for students. These virtual experiences are what address our design goals directly, whereas the other functionalities revolve around this virtual experience.

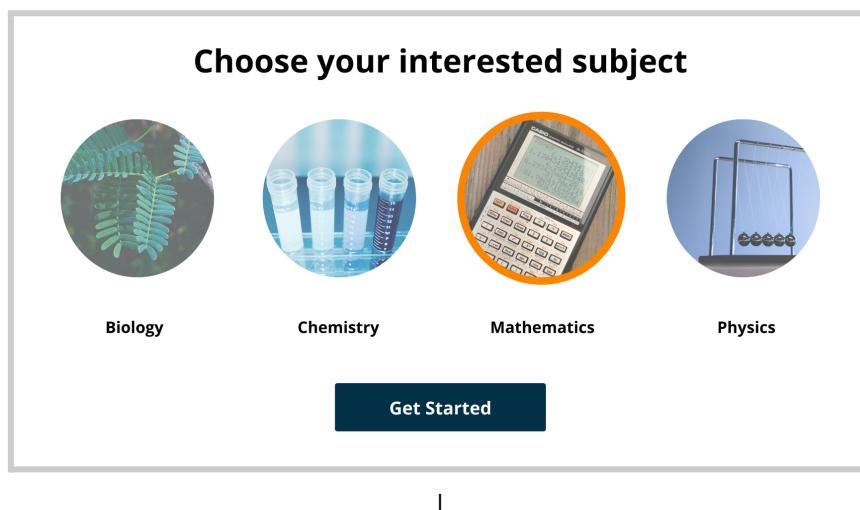
In the virtual excursions, students receive a walkthrough of a site or facility from a professional. They take place in any location which involves STEM related products, services and careers, and are hosted by professionals themselves. Ideally, the excursion has a direct correlation with the theory and content covered in class so that students get to see the practicality and impact of what they're studying at school, achieving design goal 1.



3. Career Exploration

Career exploration is built upon the fundamental STEM subjects. Our platform aims to provide plenty of valuable information on future careers for rural students to acknowledge how these basic courses are highly relevant to their future careers, which would become their motivation to keep on emphasizing fundamental education. With the accessible multiple career description, users might be inspired by them and then turn their temporary learning goals into long-term goals throughout their life.

The user would choose his preferred subject to enter in. Our interfaces would present lists of cards horizontally with the titles and locations of each career for users to click on.



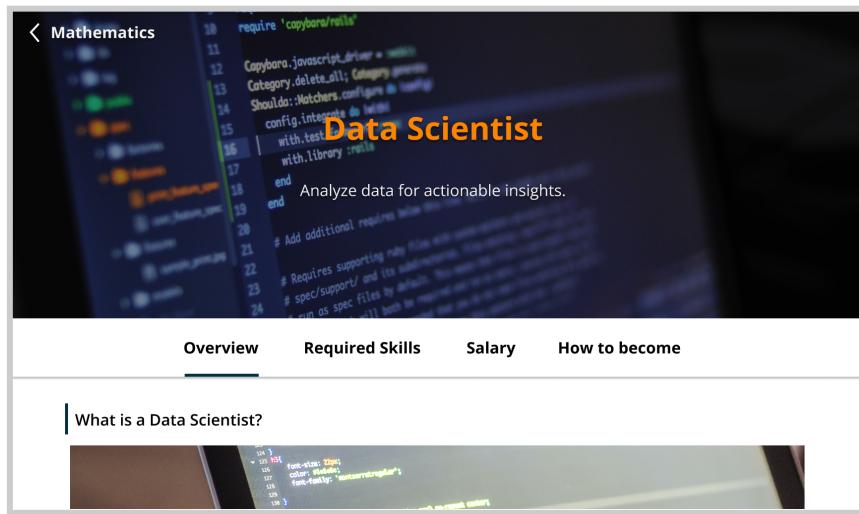
The image shows a detailed career page for the Mathematics subject. At the top, there is a back arrow, the title "Mathematics", and three search/filter buttons: "What" (with a magnifying glass icon), "Where" (with a location pin icon), and "Find Job". Below these are three cards representing careers:

- Accounting** (Sydney, NSW) - Shows a hand using a calculator next to a laptop and some cash.
- Data Scientist** (Sydney, NSW) - Shows a computer screen displaying complex data and code.
- Product Desig** (Sydney, NSW) - Shows a hand writing in a spiral notebook.

Each card has a "Learn more →" link at the bottom right.

The detailed career page offers users enough information to browse. There are 4 main classes — Overview, Required Skills, Salary, and How To Become. Each subtitle would

directly show the necessary description for users to understand the significance of the career.



Hardware/Software requirements

Since we were designing for the rural context, many of which have limited or low-end technology, it was important for our concept to be able to run with limited hardware and software requirements.

CareerCourse is a simple web-based LMS, which requires only a PC with minimal computing power and an internet connection. The ideal experience is on a PC rather than a mobile phone. Access to budget laptops are quite common in the contemporary rural context in Australia.

Setup Instructions

As we developed our prototype based on Figma, the set up to our prototype would only require the Figma link to our prototype file. The design of our prototype was currently only aimed for computer screen usage, so it is also required that the prototype should be accessed through a laptop or PC to ensure the dimension presented remains as intended.

Known Issues

Number of career variations for avatars

One of the features of CareerCourse is the variation of careers available for the Avatars. Whilst the prototype shows an avatar progressing in their career as a medical student to a doctor, a future version would showcase different careers and pathways which the user could level up in.

Different subjects in school would add experience points to the different careers of Avatars. For example, Avatars would progress in their 'doctor' career when users complete biology or chemistry related careers, but not mathematics. Completing mathematics courses would however increase the experience of the engineering career pathway. This way, users can obtain a feeling of progression in different fields and careers, not just one.

Future Work/Versions

We intend for future works to include other unlockables besides virtual excursions. As virtual excursions are often done collectively as a class, in practice it would not be strange for students to all be at the same level or status. There is an issue here regarding variation between the avatars in a given classroom - everyone would hold the same status. A system of in game points gained with completing modules, and being able to expand those points for cosmetics or other features.

Bibliography

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