



Technology Product Development Accelerator – Full Stack Developer Mission X – Final Portfolio Assessment

Learning Outcomes

This Mission is designed to support you to achieve the following learning outcomes:

- **Learning Outcome 1** - Analyse and select best fit solutions of existing and upcoming technologies in order to develop a technology product solution.
- **Learning Outcome 2** - Apply broad technical knowledge to develop a technology product solution.
- **Learning Outcome 3** - Apply security and technology product development best practices to deliver quality outcomes in the context of practice.
- **Learning Outcome 4** - Apply personal development and portfolio deployment practices with the purpose of becoming a reflective learner.
- **Learning Outcome 5** - Apply general collaboration skills to work as an effective team member.

Mission Brief

Learners are required to participate in a simulated organisational environment, performing the role of software developers for an organisation. Their task is to work collaboratively in a team to complete the development of an application, according to the technical and functional requirements specified in Appendix A to this assessment briefing. The learner team will use appropriate technologies to build the different parts of the application, consistently apply industry standard best practices, and ensure that the team is working effectively together for the duration of the project. In order to achieve this outcome, team members will be required to undertake additional research and learning outside of what is being taught in class.

Mission Tasks

Mission Ready assigns each project participant to work in a team consisting of 4-6 individuals. The team is provided with a detailed project briefing (see Appendix A) and is required to meet the requirements of that briefing within the allocated time limitations.

Even though this mission requires collaborative team work, learners are assessed on an individual basis. There is no requirement for the team as a whole to complete every page in the specification in Appendix A. Instead, each individual must complete at least two (2) pages within that specification, work together as a team on common components, and jointly present a coherent application (not just a collection of disjointed pages from a few individuals). It is strongly suggested that the team get together at the beginning of the project, to identify how they divide up the work and to ensure their code are integrated. Specific tasks to be performed by all team members working together are:

- Read carefully through the project brief and allocate specific task responsibilities to each individual team member. The total work load should be divided reasonably equally between team members; in particular, each team member must be assigned responsibility for completion of at least two (2) pages in the finished application, with full stack responsibility (both front end and back end) for development of at least one (1) page.
- Create a working application according to the design specification in Appendix A, and host the application on a public server or on a team member's laptop.

- Host all the source code for the Mission in a GitHub account, with evidence of collaboration including a history of commit and push code. Submit a link to your GitHub project prior to the team's demonstration of its application.
- Demonstrate the completed application, on the last day of the programme. The demonstration should include an explanation of the GUI, the servers used, showing the front end code, back end code, and database. The duration of this demonstration should be no longer than 15 minutes.

In addition, the following task must be completed by each individual learner, working alone:

- Complete a "Project Evaluation Form" (Appendix B), describing the additional research that was done by the team, the technologies that were used, why those technologies were selected, and how industry-standard technical knowledge and skills were applied to develop a product solution.

Assessment

In order to successfully complete this formally assessed Mission, learners are required to submit a portfolio of evidence which includes the following items:

Jointly prepared team submission:

1. An oral product demonstration (maximum 15 minutes) to an audience that includes the Mission Ready project assessor

Individually prepared learner submissions

2. A completed Project Evaluation Form

These items are assessed on the basis of whether learner submissions meet each of the competency statements relating to the five learning outcomes. Learners must achieve an outcome of "Competent" for ALL of these competency statements to be awarded the certificate.

Time Allowance and Due Date

Learners are given this Mission in week 5 of the programme, and it must be completed by the end of week 12.

Resubmissions

The Assessor will provide the learner with feedback on the extent to which his/her work has met the requirements specified by the relevant learning outcomes. In the event that a genuine attempt has been made to meet those requirements, but one or more elements of the assessment have not been successfully completed, the learner will be allowed to submit a revised version of his/her work in response to those elements. The revised work must be submitted within 7 days of receiving the initial result.

Appendix A – Mission X Design Specification

This document provides a detailed description of the work to be done in response to the requirements of Mission X. It should be read in conjunction with the "L4 Programme Overview" and the "Mission X Marking Rubrics" documents.

Background

"LevelUp Works" is a company that provides education technologies to primary and intermediate schools in New Zealand. It is currently in the process of improving its educational technology platform, and a new application design has been created as a result. The aim of the application is to provide a Learning Management System (LMS) for school teachers to deliver the Digital Technologies curriculum (specifically, to deliver classes to learn programming)

in an easy way. It is designed so that classes can be conducted either in person or online, although there is no video component included in the application.

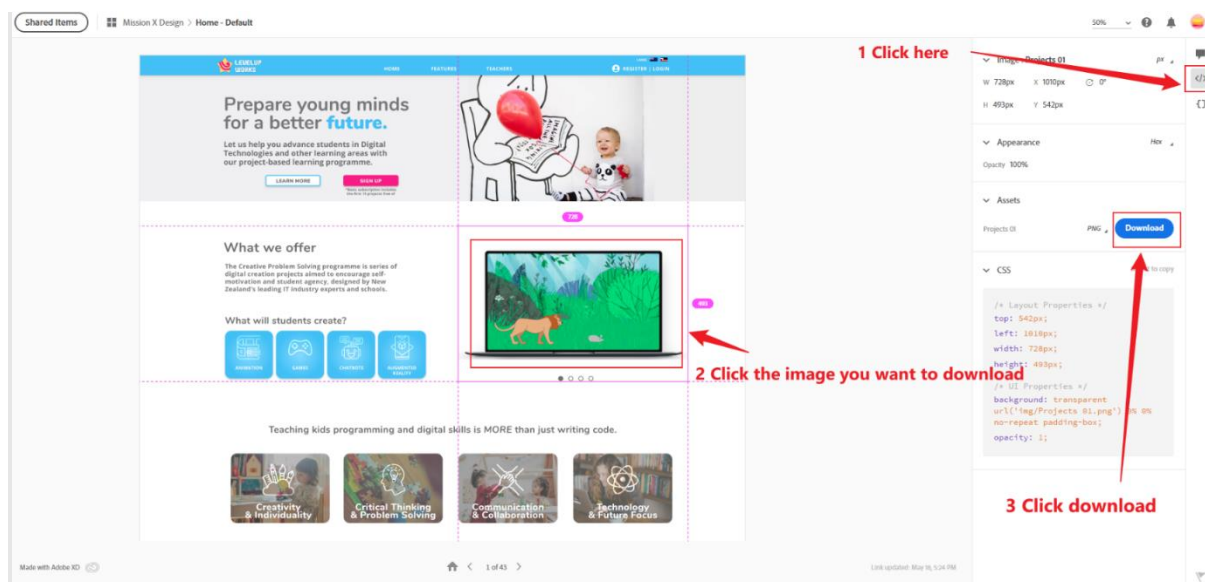
The LMS is intended to assist two main user groups, both of whom are able to register themselves on the platform :

- **School Students** use the platform to get their lesson instructions, request help, and submit work.
- **School Teachers** are able to track student progress and help students where necessary.

For a demonstration of how the application will work, click on the following link to access a prototype:

<https://xd.adobe.com/view/ce3e3e42-927e-414b-99ec-967fe6b415f7-9b6d/>

Note that the prototype is clickable; if you click anywhere on the screen, the clickable components will flash. It is also possible to download pictures from there and to get access to other details such as colour and size. The image below shows how you can access the details and download button.

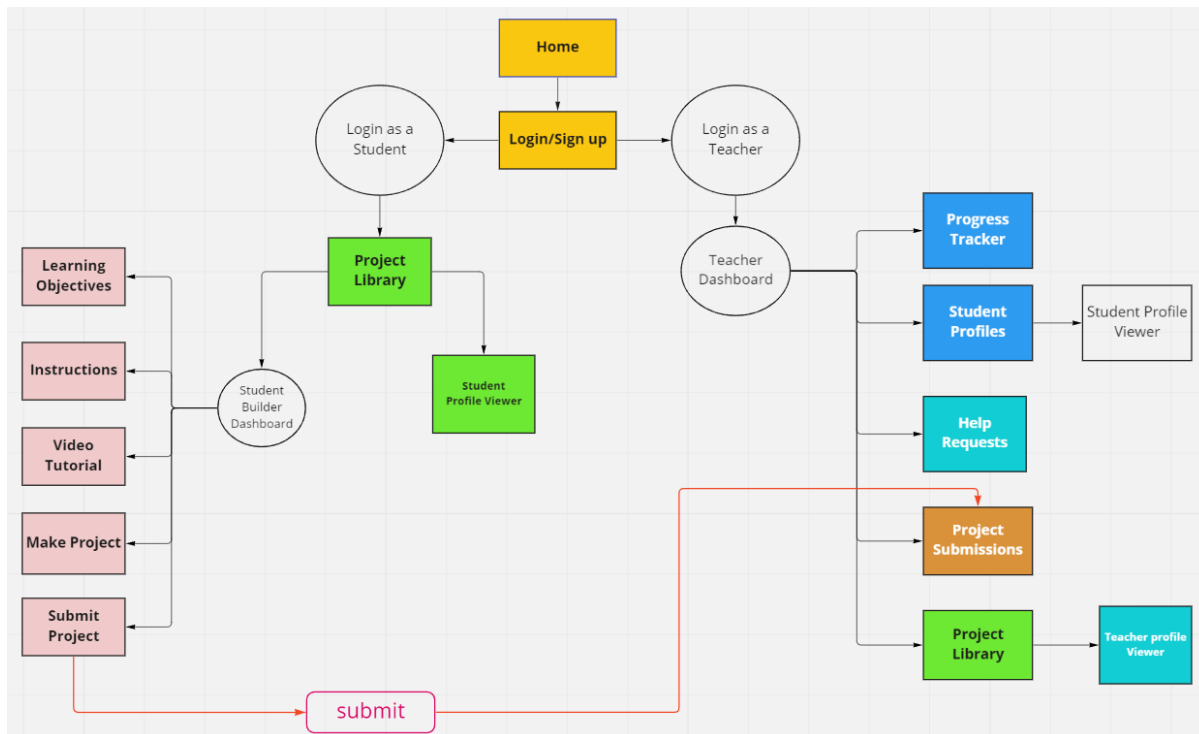


Requirements

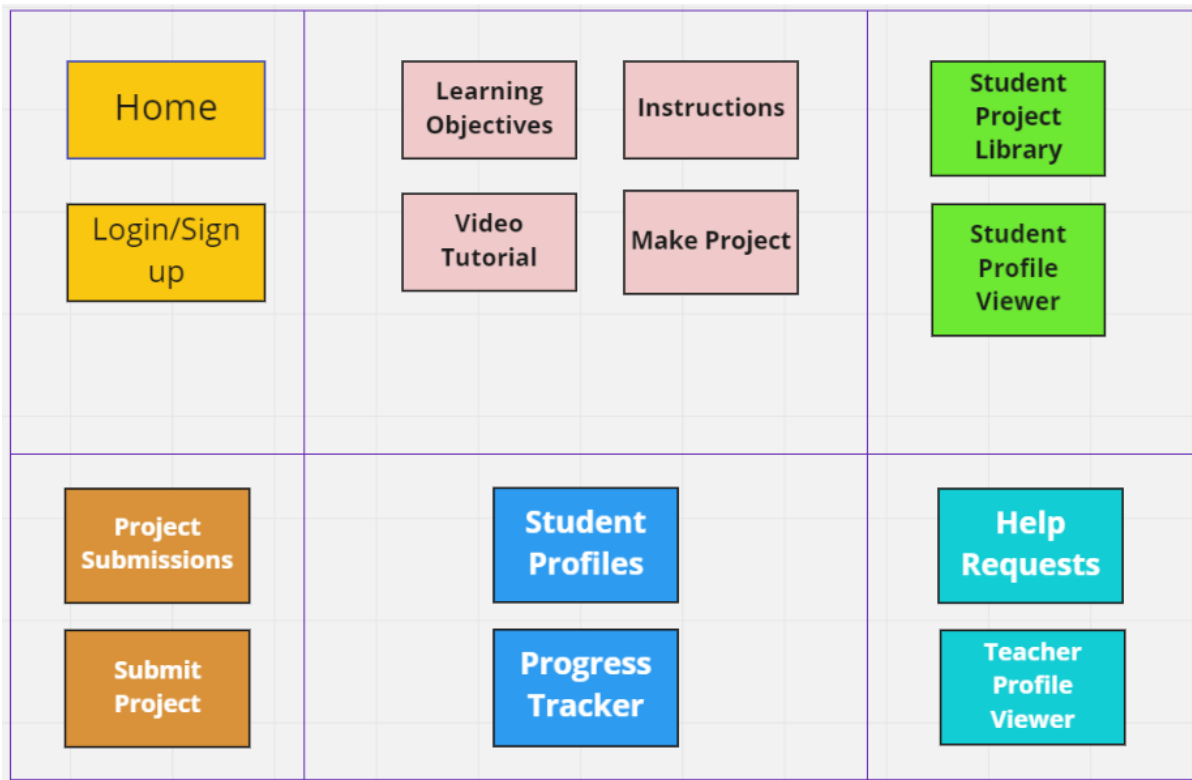
Mission X requires learner teams to:

- Build a number of application pages based on the design of the application prototype
- Apply collaboration skills to work as a team.

Learner teams are first required to build the pages of this application that have been designed in Adobe XD. The following is a sitemap for the application. For the purposes of the Mission, you are only required to complete coding for those pages designed in Adobe XD, not the entire application. Each rectangle in the site map below represents one page of the application to complete.



You will work as a team and collaborate with your team mates to complete this project. The application is divided into 6 portions as per the diagram below. Each team member needs to pick one of the portions to complete. If you are in a team of 4 people, you will only complete 4 portions as a team. You cannot swap pages with other members. However, you are encouraged to work together to share responsibilities on common components and collaborate using Github.



Assumptions

For any design elements **not** specified in the design document, in Adobe XD design, or in Miro, the team may make its own assumptions (for example, there are no screens designed for the functions of “add a class” or to “assign a student to a class”). The team’s submitted work must clearly identify any such assumptions made. For example, it can be assumed that class information will be entered directly into the database by a school administrator; it is therefore not necessary for the team to build a user interface.

Page Design Details

The details of each page can be found in [Miro](https://miro.com/app/board/uXjVO2uywL8=/?share_link_id=94355100453) (https://miro.com/app/board/uXjVO2uywL8=/?share_link_id=94355100453). The following comments are designed to provide additional detail on each of the elements that the team is required to build.

Home Page

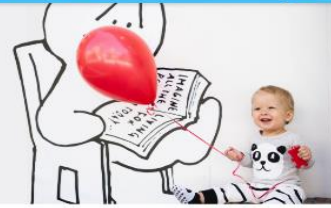
The **Home Page** is a long page with static content (a front-end-only page), designed for marketing purposes, so users can access this page without having to sign in. The page does not require any content from a database.

Prepare young minds for a better future.

Let us help you advance students in Digital Technologies and other learning areas with our project-based learning programme.

[LEARN MORE](#)
[SIGN UP](#)

After subscription, please email the B2C IT project team at info@levelupworks.com



What we offer

The Creative Problem Solving programme is a series of digital creation projects aimed to encourage self-motivation and student agency, designed by New Zealand's leading IT industry experts and schools.

What will students create?



Teaching kids programming and digital skills is MORE than just writing code.



How our programme helps teachers and schools

[LEARNING PATHWAYS](#)
[DIGITAL TECHNOLOGIES](#)
[KEY COMPETENCIES](#)
[IR4.0](#)

Enhance key competencies

The programme enhances capabilities of students in the 5 Key Competencies identified in the New Zealand Curriculum:

- THINKING**
In particular the programme focused on problem solving, design thinking and computational thinking.
- DISCERNING CODES**
Analysing language, symbols, and texts in order to understand and make sense of the codes in which knowledge is expressed.
- SELF-MANAGEMENT**
Projects and challenges are designed to motivate students to explore and experiment with self-motivation.
- RELATIONSHIPS WITH PEERS**
The programme is designed with unplugged sessions where students interact in a range of different situations, including things like being able to listen well, recognise different points of view, and share ideas.
- PARTICIPATION AND COLLABORATION**
The programme encourages students to be involved in communities, such as family, whānau, school, and contribute and make connections with other people.



What are you waiting for?

Start teaching Digital Technologies today.

If you need more information, we are happy to answer any questions you may have.

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LevelUp Works

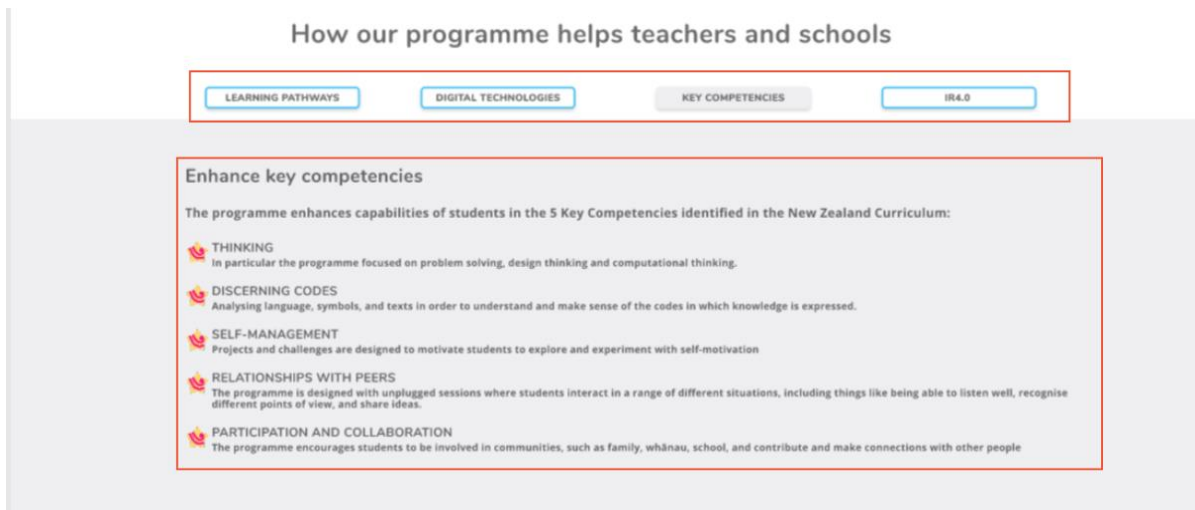
LevelUp Works is an Auckland-based enterprise dedicated to developing game-based learning software to help teachers in response to the New Zealand Digital Technologies & Hangarau Matihiko.
alan@levelupworks.com
(021) 668 185

“How our Programme Helps Teachers and Schools” Section

In the XD design and prototype, in the section entitled “How our Programme Helps Teachers and Schools”, the following four buttons are not currently clickable:

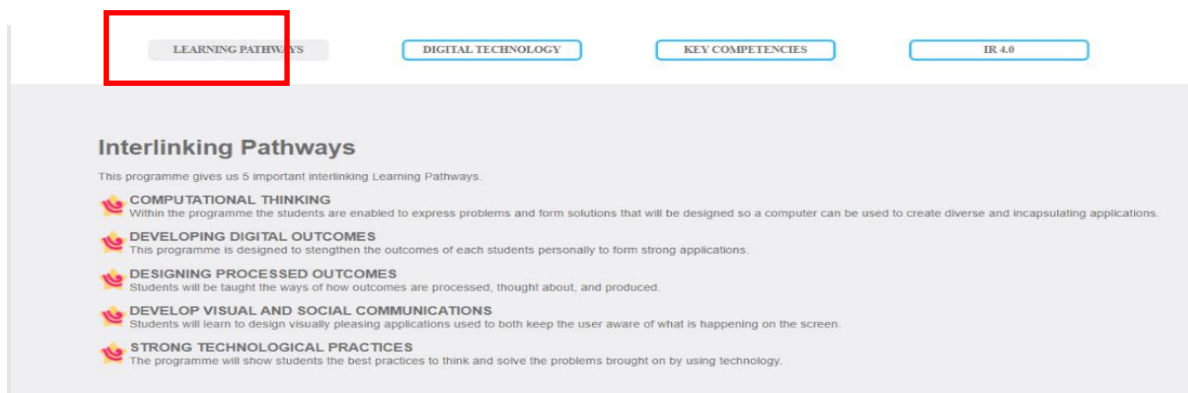


Learner team submissions should present these alternatives as clickable buttons, where clicking on any button will display the appropriate content in the grey section right below it. For example, clicking on the “key competencies” button displays content at the bottom of the following image:



Below are the contents that are displayed in the grey section after clicking each of the 4 buttons. The picture shows you the end results you should attain, whereas the text is included for you to copy and paste into your code if needed.

1. Learning Pathways button:



Interlinking Pathways

This programme gives us 5 important interlinking Learning Pathways.

COMPUTATIONAL THINKING

Within the programme the students are enabled to express problems and form solutions that will be designed so a computer can be used to create diverse and encapsulating applications.

DEVELOPING DIGITAL OUTCOMES

This programme is designed to strengthen the outcomes of each students personally to form strong applications.

DESIGNING PROCESSED OUTCOMES

Students will be taught the ways of how outcomes are processed, thought about, and produced.

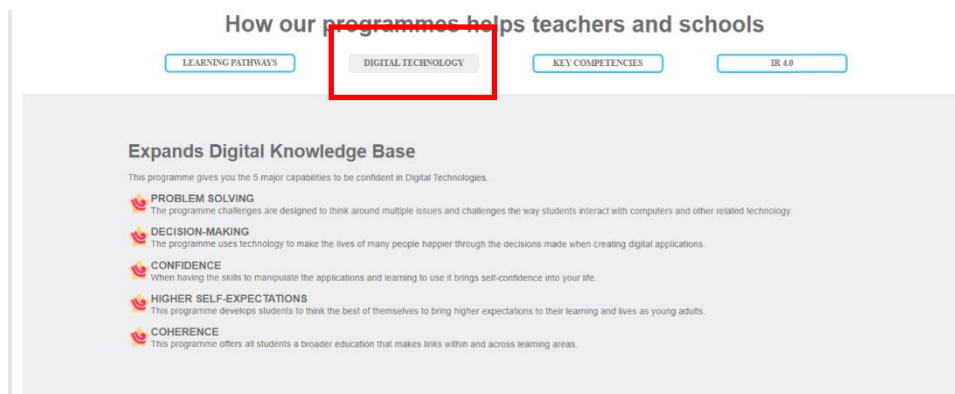
DEVELOP VISUAL AND SOCIAL COMMUNICATIONS

Students will learn to design visually pleasing applications used to both keep the user aware of what is happening on the screen.

STRONG TECHNOLOGICAL PRACTICES

The programme will show students the best practices to think and solve the problems brought on by using technology.

2. Digital Technologies button:



Expands Digital Knowledge Base

This programme gives you the 5 major capabilities to be confident in Digital Technologies.

PROBLEM SOLVING

The programme challenges are designed to think around multiple issues and challenges the way students interact with computers and other related technology.

DECISION-MAKING

The programme uses technology to make the lives of many people happier through the decisions made when creating digital applications.

CONFIDENCE

When having the skills to manipulate the applications and learning to use it brings self-confidence into your life.

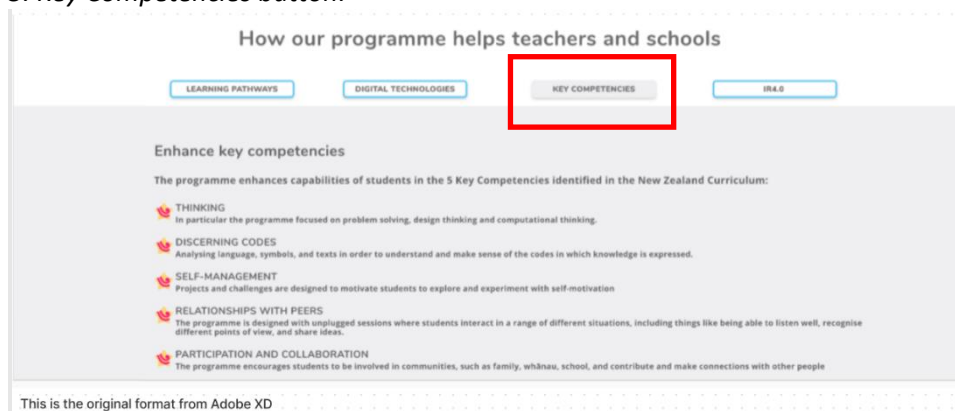
HIGHER SELF-EXPECTATIONS

This programme develops students to think the best of themselves to bring higher expectations to their learning and lives as young adults.

COHERENCE

This programme offers all students a broader education that makes links within and across learning areas.

3. Key Competencies button:



Enhance key competencies

The programme enhances capabilities of students in the 5 Key Competencies identified in the New Zealand Curriculum:

THINKING

In particular the programme focused on problem solving, design thinking and computational thinking.

DISCERNING CODES

Analysing language, symbols, and texts in order to understand and make sense of the codes in which knowledge is expressed.

SELF-MANAGEMENT

Projects and challenges are designed to motivate students to explore and experiment with self-motivation.

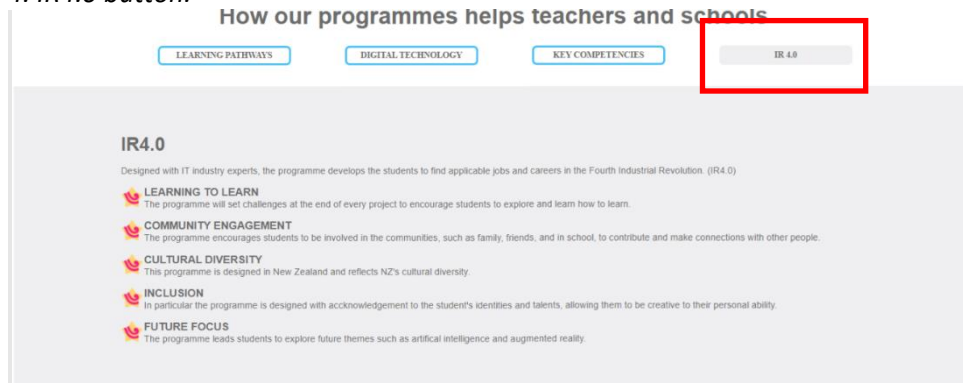
RELATIONSHIPS WITH PEERS

The programme is designed with unplugged sessions where students interact in a range of different situations, including things like being able to listen well, recognise different points of view, and share ideas.

PARTICIPATION AND COLLABORATION

The programme encourages students to be involved in communities, such as family, whanau, school, and contribute and make connections with other people.

4. IR4.0 button:



IR4.0

Designed with IT industry experts, the programme develops the students to find applicable jobs and careers in the Fourth Industrial Revolution. (IR4.0)

LEARNING TO LEARN

The programme will set challenges at the end of every project to encourage students to explore and learn how to learn.

COMMUNITY ENGAGEMENT

The programme encourages students to be involved in the communities, such as family, friends, and in school, to contribute and make connections with other people.

CULTURAL DIVERSITY

This programme is designed in New Zealand and reflects NZ's cultural diversity.

INCLUSION

In particular the programme is designed with acknowledgement to the student's identities and talents, allowing them to be creative to their personal ability.

FUTURE FOCUS

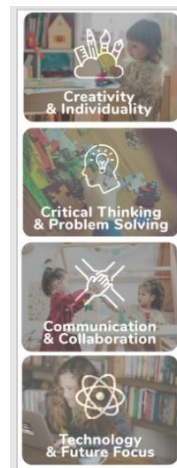
The programme leads students to explore future themes such as artificial intelligence and augmented reality.

Page Layout and Presentation

This home page can be accessed by users from any device. Although the XD design file did not include any design for a smaller form factor, such as a mobile phone. Learner teams are required to ensure that, when they are displayed on laptop screens, the following four tiles will lay out horizontally as shown below:



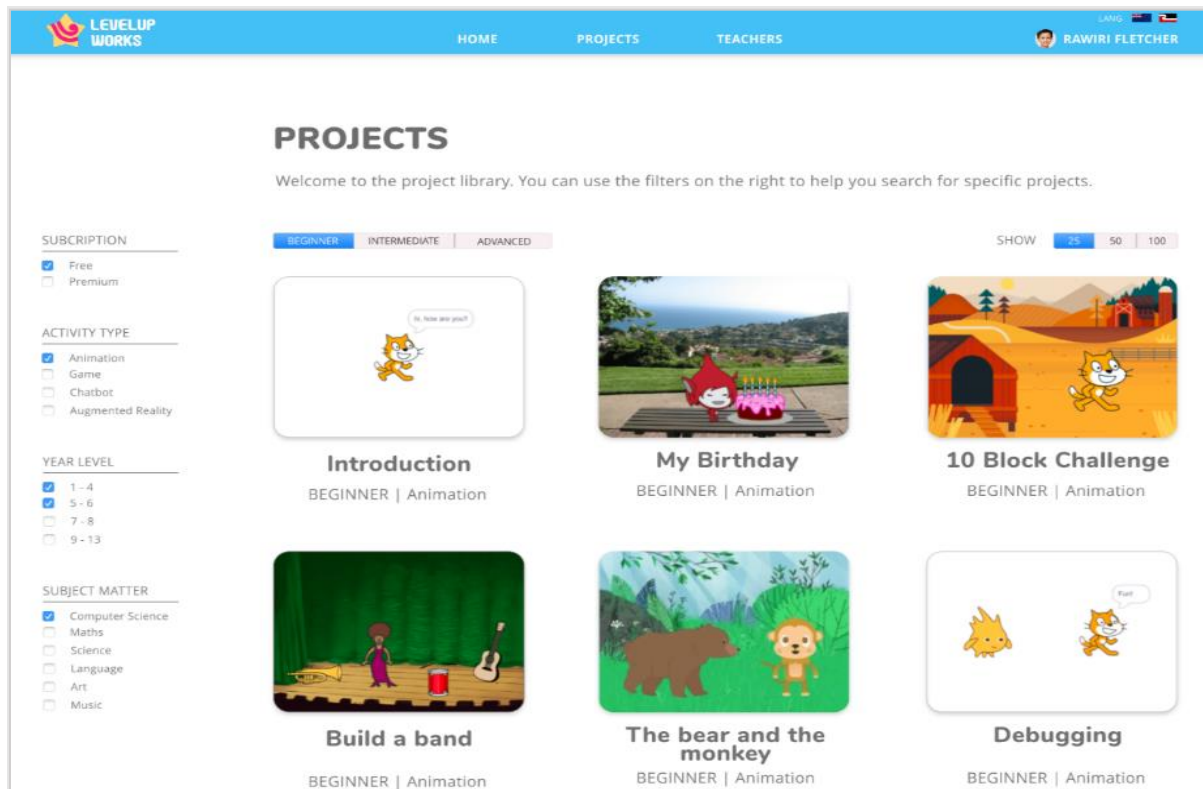
And, when the home page is displayed on mobile phones, the tiles will lay out vertically as shown below:



Student/Teacher Project Library Pages

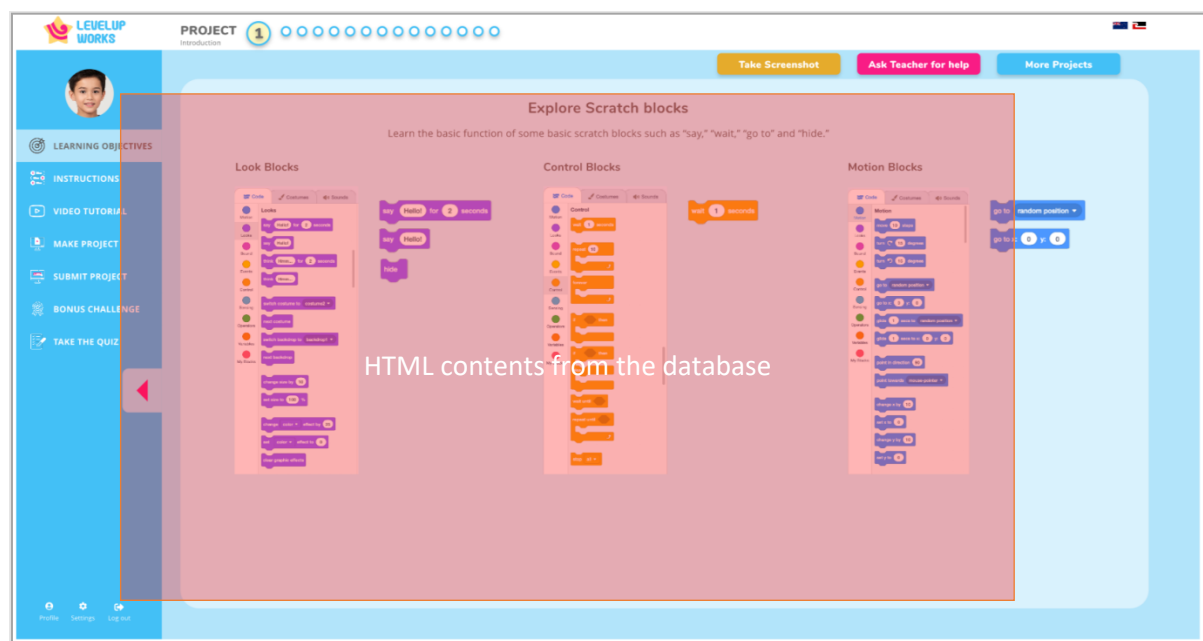
The Project Library page displays a list of projects available in the database. These pages also allow users to filter, and only display those projects that are useful to them. The list of projects can be found by visiting this website <https://levelupworks.com.wonderbean.a2hosted.com/levels/> and clicking on the Projects menu item. Learner teams will need to login using username “terry” and password “terry1234” to access this page.

Learner team submissions must demonstrate page functionality by including a display of at least three (3) projects, and may get the project pictures and contents from <https://levelupworks.com.wonderbean.a2hosted.com/levels/index.php/projects/>. Teams may make any necessary assumptions about the attributes for each project, such as their Subscription, Activity Type, Year Level, Subject Matter.



Student/Teacher Project Builder Pages

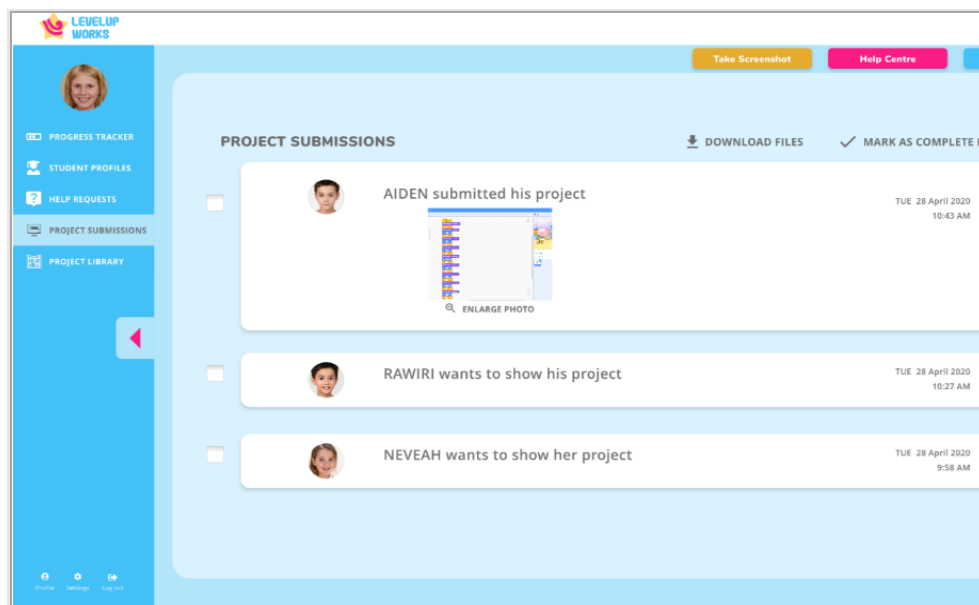
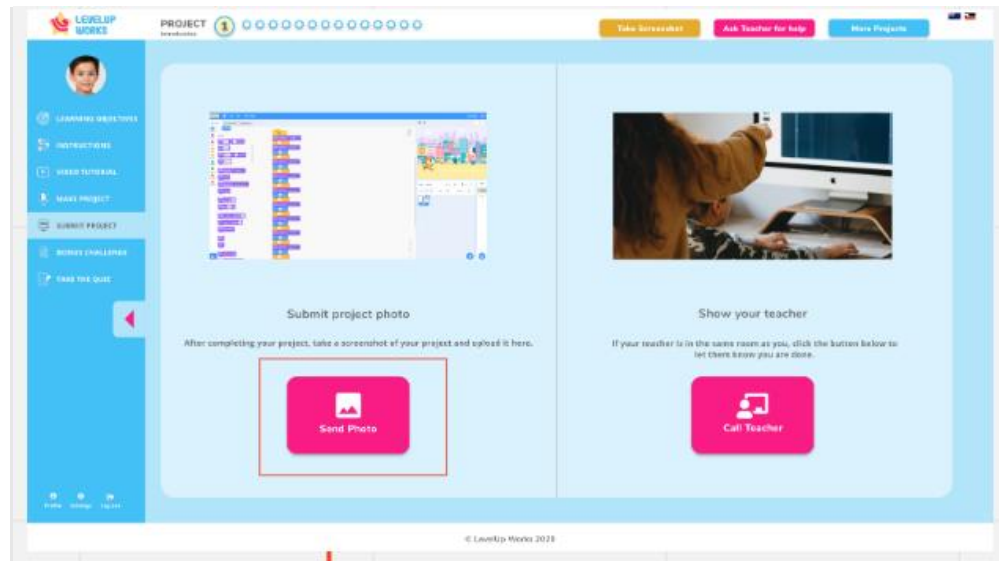
The **Project Builder** page is the main workbench for students. **Learning Objectives**, **Instructions**, **Video Tutorial**, and **Make Project** pages only display the HTML contents from the database. In other words, the database will store the relevant content as HTML, and the project builder pages will take that HTML content and display it as the content of those pages. For the **Make Project** page, you don't need to embed the real Scratch page. You can just display a static image of a screenshot stored in the image folder of your application and linked it from the database.



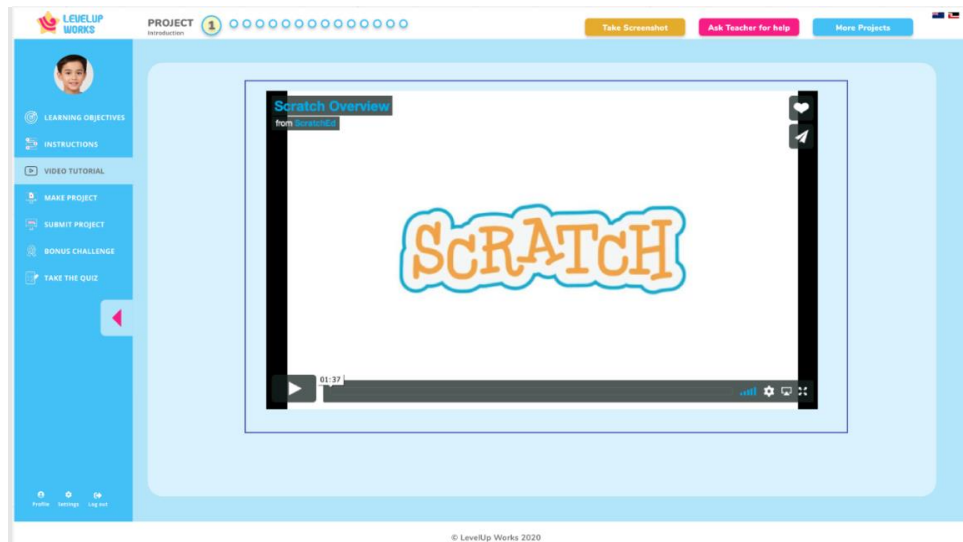
The red “arrow” between the left hand menu and the main contents will toggle between shrinking the menu to the left into icons or displaying them as full text.

The “Submit Project” menu item has two buttons within it. You only need to implement the button on the left.

1. If the student clicks on “Send Photo” button, the platform will send a “Submit” request to the teacher with a screenshot. You will need to create a function that allow you to upload a file attachment (the screenshot) to the server with a link in the database. The teacher will see it displayed like the first entry in the screenshot below by reading from the database.
2. The Learner team do not need to implement functionality for the “Call Teacher” button.



For the purposes of this Mission, the “**video tutorials**” displays a YouTube Video. The video’s URL is stored as a link in the database.



For the purposes of this Mission, the **“Instructions”** menu item only displays a page of instructions. Instructions are stored in the database as HTML code.



Learner teams do not need to build pages for the **“Bonus Challenge”** and the **“Take the Quiz”** sections.

Technical Design Requirements

The technical requirements of this platform are:

- The application needs to work in at least one of the four major browsers (Safari, Chrome, Firefox or Edge).
- Users will access the home page from either mobile phone or from desktop, so your code should make sure that the application displays the home page clearly on both platforms.
- Users are not expected to access the logged-in portion of the application via mobile or iPad, so you do not need to worry about those devices.
- Ideally, both the frontend and back end of the application are written in JavaScript as opposed to other programming languages, so LevelUp Works' JavaScript developers can support it going forward.
- The project data (such as Learning Objectives, Instructions) need to be stored in a database. They are not hard coded in the HTML/JavaScript.
- The user data are stored in the database. They are not hard coded in the HTML/JavaScript.

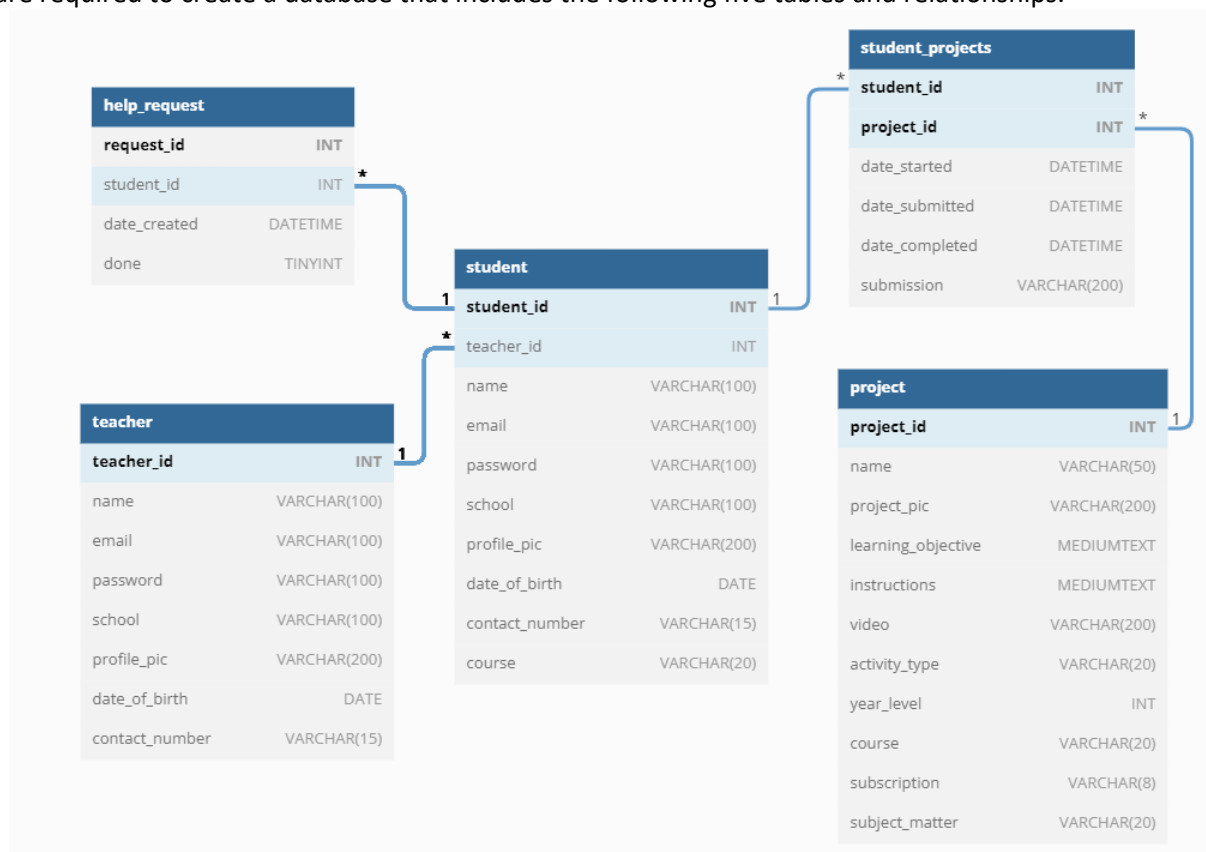
Functional Requirements / User Stories

The platform has the following high level user stories / functional requirements:

- As a teacher, I want to see the reason why my school should sign up for LevelUp Works
- As a user, I want to sign up
- As a user, I want to login to the platform
- As a user, I want to logout from the platform
- As a user, I want to see a list of projects available to be used, and to filter these by attributes
- As a student, I want to see learning objectives and get coding lesson instructions and videos
- As a student, I want to submit work to a teacher
- As a student, I want to minimise the left hand navigation menu
- As a user, I want to see my profile data
- As a teacher, I want to track the progress of students
- As a teacher, I want to see student submissions and mark them as completed

Database Design

The following Entity Relationship Diagram (ERD) shows the relational database design for this application. Learner teams are required to create a database that includes the following five tables and relationships.



See following tables for detailed data definitions. The primary key field of each database table is highlighted in the tables below.

project Table

Every row in the project table represents a project that students can work on. Below are the definitions of each field:

Field	Data Type	Example	Note
project_id	INT, AI	10	Primary Key
name	VARCHAR (50)	Project 01 - Make a Story	Title of the project
project_pic	VARCHAR (200)	/images/projects/Project01.png	

learning_objective	MEDIUMTEXT	The learning objective for this session is conditional statements including if...then.	HTML code of the content to display
instructions	MEDIUMTEXT	<h2>Step 1</h2> <p>Create a new variable. Here is a screenshot: </p>	HTML code of the content to display
video	VARCHAR(200)	https://www.youtube.com/watch?v=21j_OCnLuYg	A link to an online video
activity_type	VARCHAR(20)	chatbot	Options: animation, game, chatbot or augmented reality
year_level	INT	4	Represents school year level of students, ranges from 1 to 13
course	VARCHAR(20)	Beginner	Options: Beginner, Intermediate, Advanced
subscription	VARCHAR(20)	Free	Options: Free, Premium
subject_matter	VARCHAR(20)	computer science, maths, language, art, music	Options: computer science, maths, language, art, music

help_request Table

Every row in the help_request table represents a request for help issued from student to teacher. A new row is created when a student clicks the button to request for help. The Done column will be updated to True when teacher mark the Help Request as Done. Below are the definitions of each field:

Field	Data Type	Example	Note
request_id	INT, AI	39	Primary key
student_id	INT	23	Foreign Key
date_created	DATETIME	2020-12-31 23:59:59	
done	TINYINT	1	TINYINT (1)=true TINYINT (0)=false

student Table

Every row in the student table represents a student user with a login. Below are the definitions of each field:

Field	Data Type	Example	Note
student_id	INT, AI	23	Primary Key
teacher_id	INT	34	Foreign key
name	VARCHAR(100)	Aiden Andrews	Name of student
email	VARCHAR (100)	aiden@ranuiprimary.school.nz	
password	VARCHAR(20)	123	Can be hashed or plain text
school	VARCHAR(100)	Ranui Primary School	
profile_pic	VARCHAR(200)	/images/students/AidenAndrews.png	Stores the link to a profile picture
date_of_birth	DATE	2010-12-31	
contact_number	VARCHAR(15)	09-234-5678	

course	VARCHAR(20)	Beginner	Options: Beginner, Intermediate, Advanced
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student_projects Table

Every row in the student_projects table represents a student's progress on a particular project. The table is identified jointly by student_id and project_id (a composite primary key). A new entry will be created when a student opens a project for the first time, with empty date_submitted and date_completed fields. When the student submits a screenshot for the teacher to review, the date_submitted field will be updated with the current date. When a teacher marks the work as Completed, the date_completed field will be updated with the current date. If a project is submitted multiple times, date_submitted will be overwritten every time it is re-submitted, storing only the latest date. Below are the definitions of each field:

Field	Data Type	Example	Note
student_id	INT	23	Primary Key, Foreign Key
project_id	INT	10	Primary Key, Foreign Key
date_started	DATETIME	2020-12-31 23:59:59	The date when the student started this project
date_submitted	DATETIME	2020-12-31 23:59:59	The last date the student submitted the project for review
date_completed	DATETIME	2020-12-31 23:59:59	The date teacher marked the project complete
submission	VARCHAR(200)	https://cdn.filestackcontent.com/VfOA9GyQC06oZpOvroAi	Link to the screen capture that the student submitted, blank if students has not submitted or only submitted for teacher to manually inspect

teacher Table

Every row in the teacher table represents a teacher user with a login. Below are the definitions of each field:

Field	Data Type	Example	Note
teacher_id	INT, AI	23	Primary Key
name	VARCHAR(100)	Peter Pan	Name of user
email	VARCHAR (100)	Peter.pan@ranuiprimary.school.nz	
password	VARCHAR(20)	123	Can be hashed or plain text
school	VARCHAR(100)	Ranui Primary School	
profile_pic	VARCHAR(200)	/images/peterpan.jpg	Stores the link to a profile picture
date_of_birth	DATE	1987-12-30	
contact_number	VARCHAR(15)	09-234-5678	

The table below provides the relationship between pages and the database table and fields. The data type of the fields are in orange colour.

Page	Table	Related content
Home	None	

Login/Sign up	student	name VARCHAR(100) email VARCHAR(100)
	teacher	password VARCHAR(100)
Project Library	project	name VARCHAR(50) activity_type VARCHAR(20) year_level INT course VARCHAR(20) subscription VARCHAR(20) subject_matter VARCHAR(20)
Student Profile Viewer	student	name VARCHAR(100) email VARCHAR(100) school VARCHAR(100) profile_pic VARCHAR(200) date_of_birth DATE contact_number VARCHAR(15) course VARCHAR(20)
Teacher Profile viewer	teacher	name VARCHAR(100) email VARCHAR(100) school VARCHAR(100) profile_pic VARCHAR(200) date_of_birth DATE contact_number VARCHAR(15)
Learning Objectives	project	learning_objective MEDIUMTEXT
Instructions	project	instructions MEDIUMTEXT
Video Tutorial	project	video VARCHAR(200)
Make Project	None	
Submit Project	student_projects	submission VARCHAR(200)
Progress Tracker	student_projects	project_id INT date_completed DATE
	student	name VARCHAR(100)
Student Profiles	student	name VARCHAR(100) profile_pic VARCHAR(200)
Help Requests	help_request	date_created DATETIME done TINYINT
	student	name VARCHAR(100) profile_pic VARCHAR(200)
Project Submissions	student_projects	submission VARCHAR(200) date_submitted DATE
	student	name VARCHAR(100) profile_pic VARCHAR(200)

Appendix B – Project & Self Evaluation Form

You are required to complete this evaluation form before your final presentation of Mission X. Accurate completion of this form is a requirement for successful programme completion.

1. What technologies (or code libraries) did you use to build the front-end, back-end, and database in this Mission? What is one alternative technology you could have used instead for each of the front-end, backend and database components? What are the benefits, strengths, and limitations for each of the technologies you used, compared to any alternatives?

2. If you could choose an upcoming technology (e.g. Machine Learning, Blockchain, Chatbot, Virtual Reality) to add to your solution in this Mission to enhance its functionality, what technology would you choose? How would applying this technology improve the solution? What are the benefits, strengths and limitations of this technology you chose?

3. What software security practice have you applied or do you think you should apply in this project? How would that benefit the project?

4. What extra research and learning did you do to assist in completing the Mission? What research findings were applied to the code in this Mission, and how were they applied? (Please be specific, and include references to any research sources that were used.)

5. What is the address of the Github link to your work? Paste the link below. How have you (or would you) use your own Github as a portfolio to help you with further learning?

6. What specific responsibilities were allocated to you as your contribution to team performance during this Mission? (e.g. develop page A and page B, component XYZ).

7. Describe an instance during this Mission where you asked for input from one or more team member(s), or you listened to feedback from them, and then changed your mind as a result.

8. Describe an instance during this Mission where you provided feedback to one or more team member(s), or negotiated with them, and then they changed their mind or you reached a consensus with them as a result.

9. Reflecting on how you worked on the Mission, how important was it for you to be able to work effectively in collaboration with your team-mates; how effectively did you think you were able to do so; how effectively were your team-mates able to do so?

10. Based on the work that you did during the Mission, what areas in your knowledge and of your self would you like to improve on? Please include at least one technical area and one non-technical area.

Peer Review Form

For **EACH** one of your project team members excluding yourself, complete the following:

Question	Answer
What is your team member's name?	
Did he/she regularly attend meetings?	Yes/No
Did he/she deliver on his/her agreed work in time?	Yes/No
Did he/she demonstrate mutual respect for you and others?	Yes/No
Did he/she communicate his/her ideas clearly with you or the team?	Yes/No
Did he/she allow others to express themselves and try to understand?	Yes/No
Any comments you would like to add:	