Halls of Ivy

INNOVATION. COLLABORATION. ENTERPRISE.

Change a Million Lives.
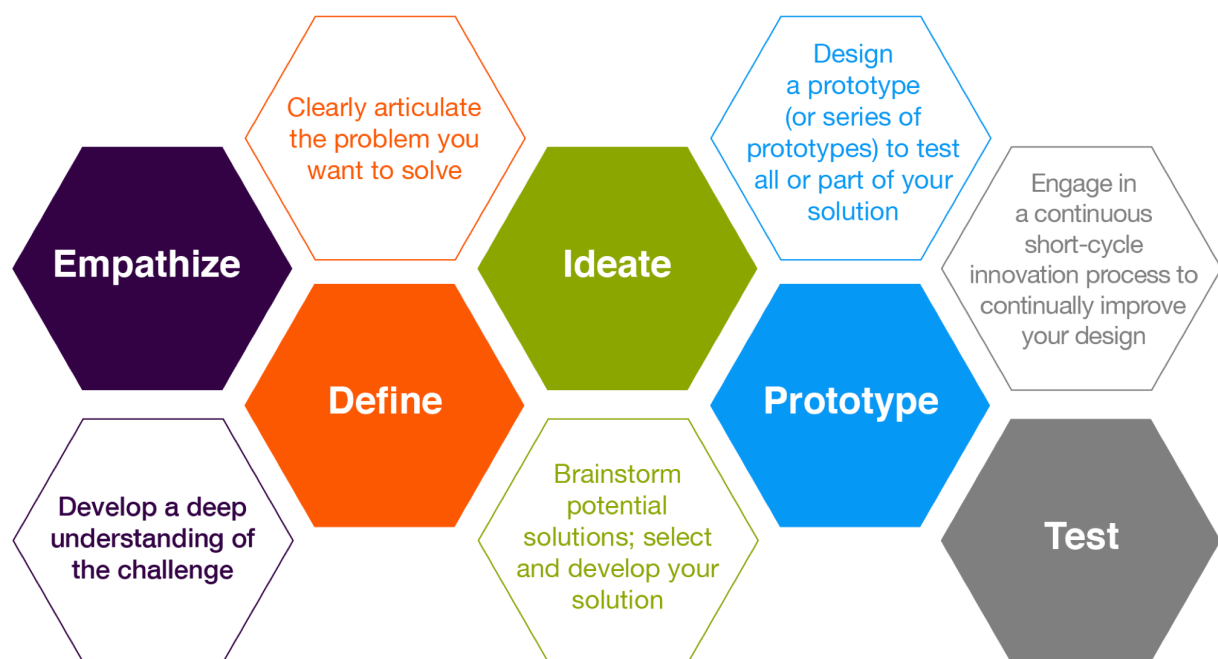
1st Edition

Introduction to Project

The project aims to fuse themes of the Expo 2020 and UAE Vision 2021 with entrepreneurial, collaborative and innovative skills to teach a project-based learning extra-curricular program to gifted and talented students in grades 6-12; the purpose of which is to give students the skills to rethink their involvement in the unknown future. The KHDA and National Agendas' expectations of all schools in Dubai demand a curriculum that includes innovation and entrepreneurialism: this bespoke program aims to meet those expectations through a 12-week course that focuses on the process of the task whilst engaging students with STEAM and entrepreneurial topics. Students will follow the Design Thinking Process:

Getting Started

A group of 8 students will begin their 12 week journey together and will be split into 2 teams of 4 to compete for the best product. Students are challenged to create a product that positively changes a million lives. Each product is expected to have at least one part that has been designed and created using 3D printing technologies.
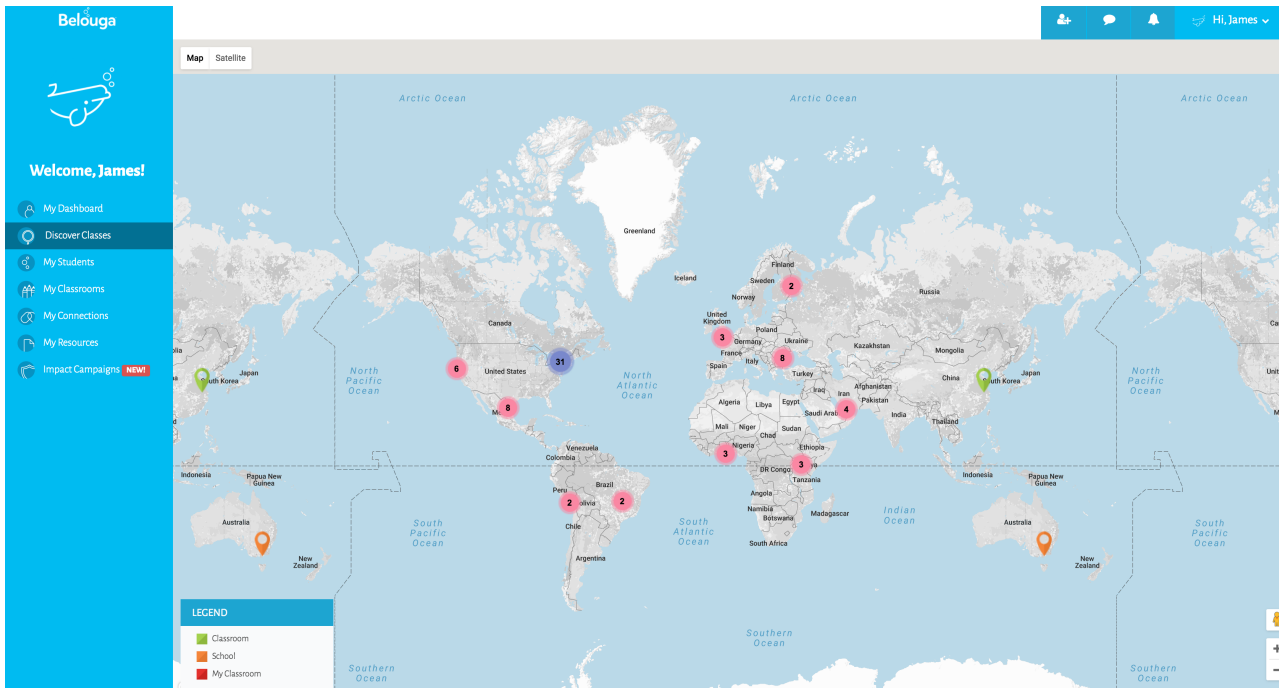
Program Structure

	Introduction	Empathize 1	Empathize 2	Define	Idea Generation	Design	Assessment
Main Tasks	Introduction to the course and STEAM; Model of Design Thinking Process	Understanding the issues affecting the global citizens; Create survey and discuss	Analyzing needs and barriers	Defining the problem from 6 perspectives: •Scientific •Technological •Engineering •Arts •Mathematical •Social; Success criteria	A variety of methods to discover new ideas to solve the problem; • Brainstorming • Mind mapping • Daydreaming • Attribute and Morphological Analysis • PIII verification	Create a project proposal of solution; Define roles	Assessment and Reflection
3D	Download Software	Basics Webinar	Browser and simple functions	Creating a simple lamp	Sketches to 3D designs	How to print and engineering of 3D printers	Creating multiple parts

	Design Using Technology	Financial Plan	Prototype	Test	Redesign	Final Product	Assessment
GROUP 1	3D design software to create solution of product	Continue 3D design software to create solution of product; Financial Plan	Use a company/design and technology resources to make prototype	Create and Test at school; Evaluation of success	Redesign based on evaluation	Create final product	Exhibition to Local Companies
3D	Creating Prototype	Materials	Sending to a printer	Test and Evaluate	Redesign Principles	Final Product	Send to customer and get feedback

Empathize

Belouga - Global Education Collaborations

Belouga offers a direct pathway for students to learn through their peers all over the world. Belouga provides a platform for students to help schools around the world get knowledge, materials and supplies that they need. Belouga leads the Global Education initiative by linking classrooms all over the world and teaches students about culture, teamwork, and empathy.

Empathy

Students use Belouga to understand issues with students in other countries and find problems that affect at least a million lives. Students will create a set of questions based on a template that lead them to find issues that can be solved by creating a product. Using this direct conversation with students in other countries they will begin to define a problem that they would like to solve.
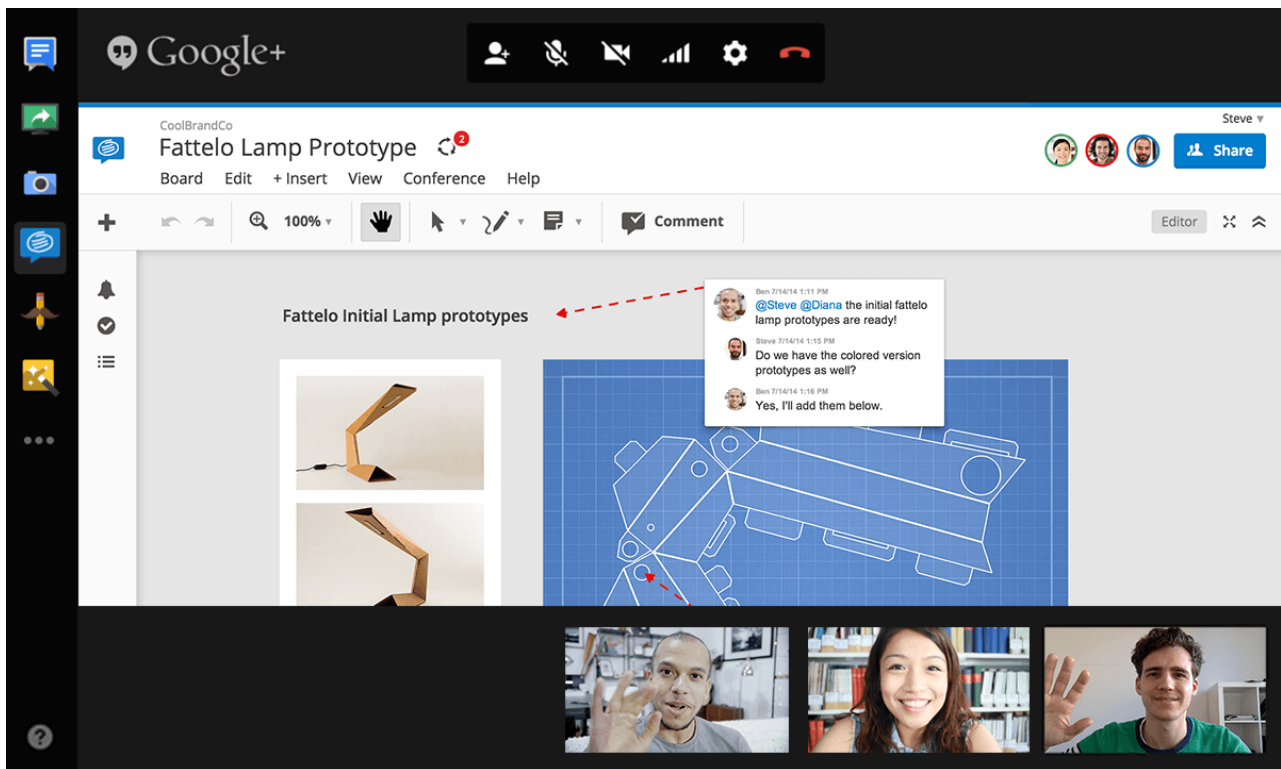
Research

During this section, students will complete research into the political and economic state of the chosen country/countries where this problem exists; often this will entail research into UN, IMF and World Bank figures as projects are global. Scientific research will also need to be conducted to gain an understanding of the problems they will face.

Define

Google Hangouts - Team Collaboration

In order to succeed students will need to communicate effectively, this will be done officially through Google Hangouts. Defining the problem is divided into 2 areas: firstly, a sentence will be created that explains the problem concisely, for example:

> "Our team will distribute a product that can filter 1,000,000 liters of water to a potable standard to at least a million people in areas without resources for under $5 per unit and create a distribution model for NGOs that is sustainable."

Secondly, a success criteria will be created based on Section 1 and this should be agreed upon by both parties. The success criteria is the fundamental tool to examine when creating new ideas or evaluating the finished product.

Ideate
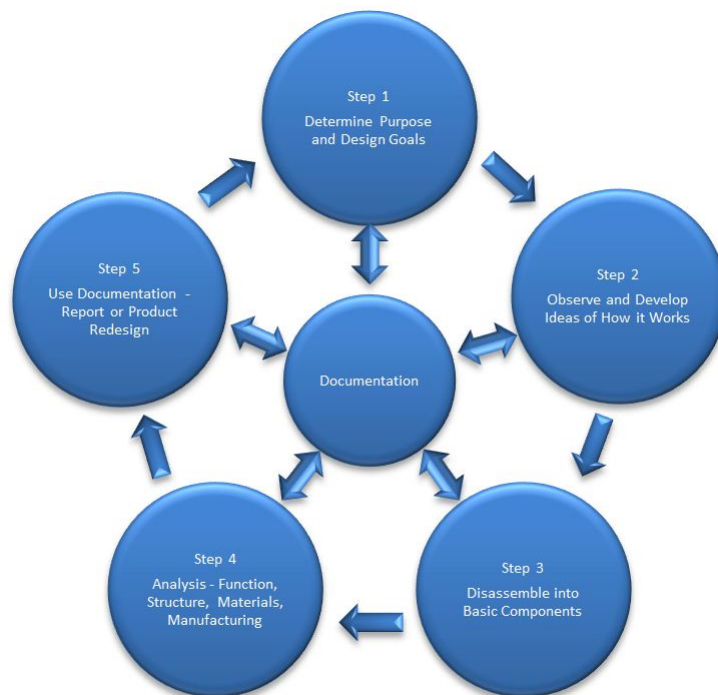## *5 methods to create valid and authentic ideas*

Students will now be working in 2 teams of 4 and within each team individual students will be assigned one of the 4 ideation methods, use the tutorials to understand the method and practice using their assigned method. Once a range of ideas have been produced students will validate and authenticate each others ideas using the method of validation and authentication.

- Attribute Analysis

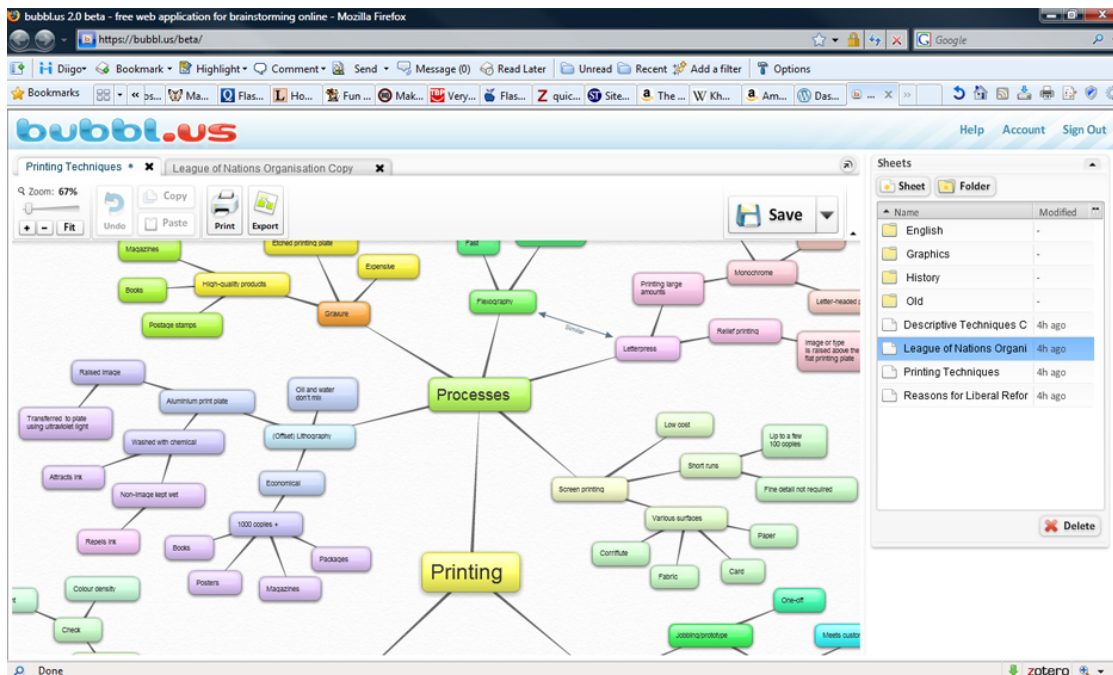| Power Supply	Bulb Type	Light Intensity	Size	Style	Finish	Material
Battery	Halogen	Low	Very Large	Modern	Black	Metal
Mains	Bulb	Medium	Large	Antique	White	Ceramic
Solar	Daylight	High	Medium	Roman	Metallic	Concrete
Generator	Colored	Variable	Small	Art Nouveau	Terracotta	Bone
Crank			Hand held	Industrial	Enamel	Glass
Gas				Ethnic	Natural	Wood
Oil					Fabric	Stone
Flame						Plastic

Students will create a list of the essential component parts based on their definition of the problem and then create a table of all of the possibilities that are available for each component.
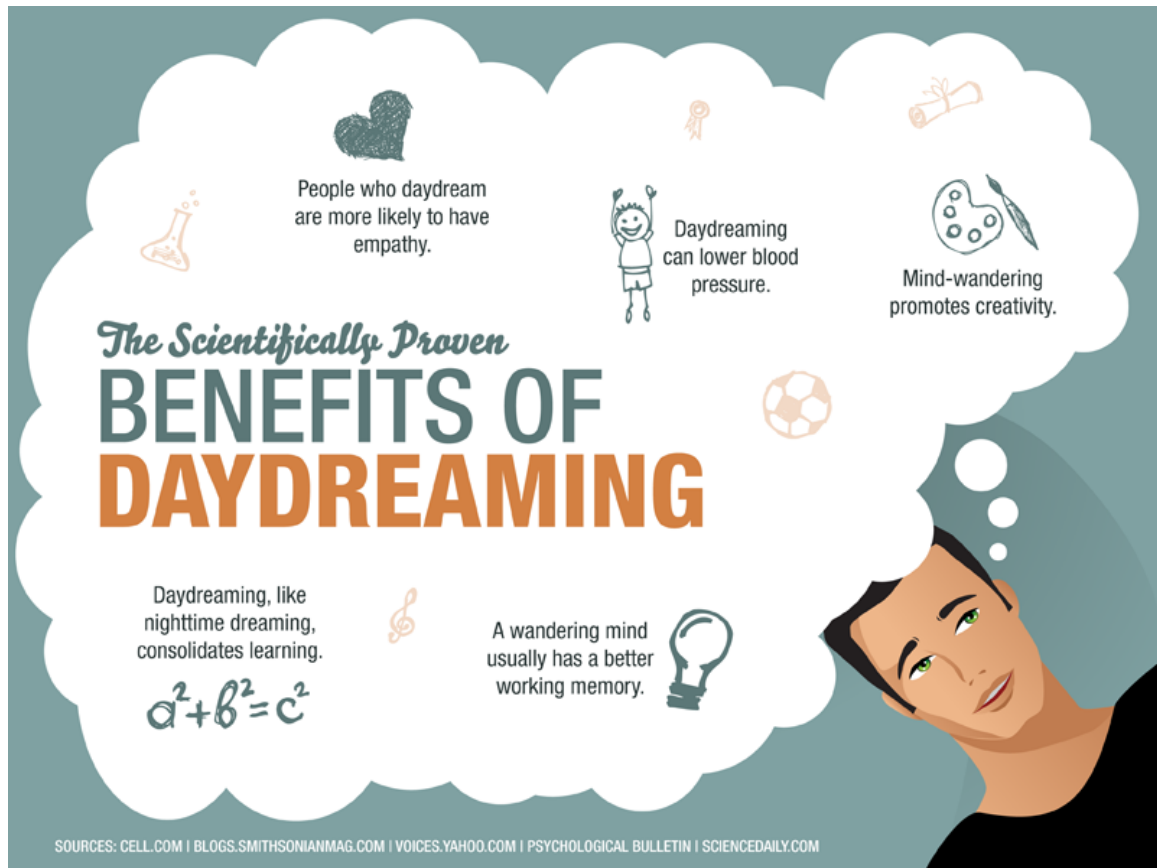
- ## Reverse Engineering

Students will find a product that has similar functionality and use reverse engineering to understand how they can modify parts or all of the product to solve their own problem.

- ## Mindmapping 2.0

Students will use bubbl.us to create a mind map that is shared amongst the team.

- Daydreaming

Students will be shown how to control their daydreaming to think both divergently and most importantly promote convergent thinking by recognizing their thinking patterns whilst daydreaming.

Validity and Authentication of ideas

Students will then follow a 3 step process to evaluate another team members ideas and these will be communicated through Google Hangouts. This involves:

‣ Sharing the idea with family and friends and asking for feedback

‣ Discussing the ideas with a professional or academic in the field

‣ Looking online for similar products and completing a compare and contrast on the existing product and the new idea.

Prototype and Business
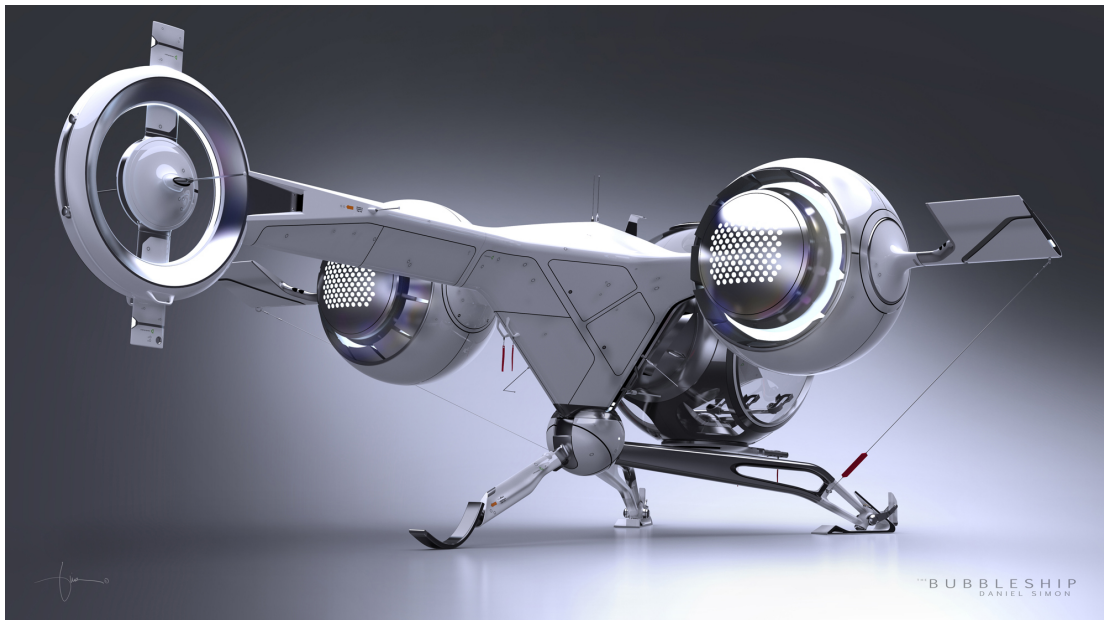## *Autodesk Fusion 360 - 3D Printing*

Students are now ready to create a concept design of their product. Up until this point the students will have been learning how to use Fusion 360 through various online webinars, tutorials and design challenges, however, during this section students are assigned roles for the development of the business model:

- **Student A - Project Manager**

The Project Manager will assign deadlines and meetings to deliver the product by a predetermined date. Tutorials on the following are provided:

  ‣ Project Management Basics

  ‣ Gantt Chart Basics

  ‣ Communication Basics

  ‣ Resources Basics

- **Student B - Designer**

The Designer will continue their study of Fusion 360 and create a design of a prototype. This prototype is the responsibility of the team, however, ultimately the design should be submitted by one student to the project manager.

• Student C - Marketing and Branding Manager

The Marketing and Branding Manager is responsible for the following:

▸ Creating a brand

▸ Creating a website

▸ Creating an infographic

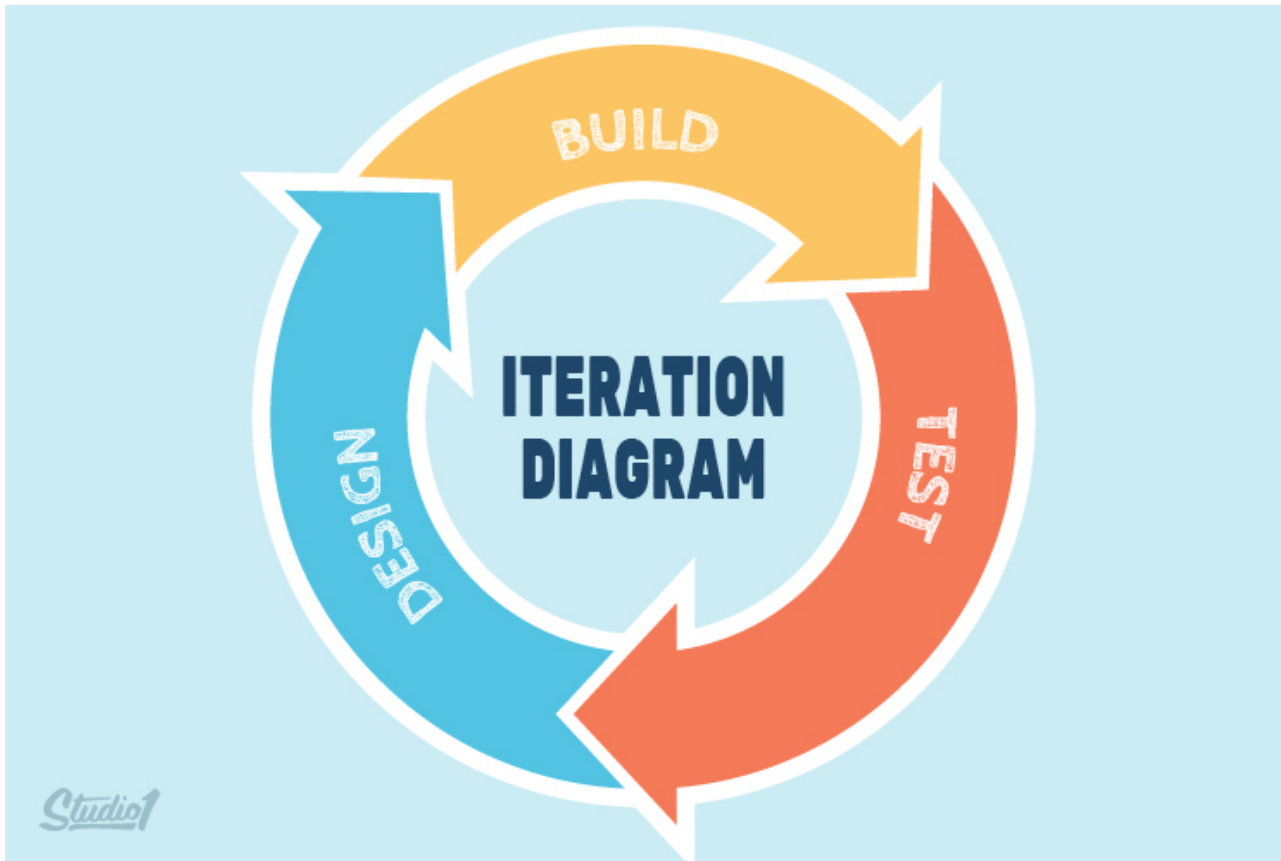▸ Creating a presentation to pitch the product to multinational companies

• Student D - Chief Financial Officer

The Chief Financial Officer is responsible for all of the economics of the project and product implementation. This includes the following:

▸ Profit and Loss Accounts

▸ Material Costs

▸ Production Costs

▸ Distribution Costs

▸ Website and Marketing Costs

Test and Evaluate
Test Product, Evaluate and Feedback to Global Partner

Once a working prototype has been created, a cycle of testing, evaluating and redesigning will begin until the product has the desired outcome. Once the product is satisfactory a demonstration will be made to the people who originally helped with defining the problem. If they are happy with the product then the product will be launched as per the instructions by the project manager.

A final assessment will be conducted using the Assessment Outcomes provided for each student. A review of the project will be conduct 3 months later to see if the target of 1 million lives have been positively affected by the product.

Costs

Fee structure and payment plan

The total cost of the program is 7200AED. The total is payable by the school and an invoice shall be provided.

This is divided by each student to be 900AED per student if the school wishes parents to pay for the course individually. A minimum of 8 students are required to complete the course, however, if more students would like to attend an additional 900AED per student will be charged.

This can then be divided to be 75AED per session per student over 12 sessions.

All payments must be made in full before the program begins or attendance will not be permitted.